Organic Gardening

AUG. 1948
25 Cents

GARDENING WITHOUT CHEMICALS

The Healthy Hunzas

by

J. I. RODALE

author of Pay Dirt

WHO are the Hunzas? Why are they so healthy and so happy? Explorers have long known that the Hunzas, tucked away in a fold of the mountains of Northern India, are an unusual race and the healthiest on earth.

Travellers have long been returning with fascinating accounts of the habits and customs of these buoyant, well-adjusted people. James Hilton knew of them, and based his best-selling LOST HORIZON on stories he had been told about the HUNZAS. The *Healthy Hunzas* really do live in Shangri-La, where there is little or no disease, delinquency or crime, where everyone is healthy and happy and lives to a ripe old age. Mr. Rodale believes that the reason for all this too-good-to-be-true way of life rests with the good earth of Hunza-Land itself. For the Hunzas till their mountainsides in accordance with Nature's Law of Return. Readers of ORGANIC GARDENING know, of course, its credo: healthy plants, healthy soil, healthy people. The HEALTHY HUNZAS is a travelbook like no other: a fascinating account of a fabulous people—and a lesson in soil conservation. Occasionally hilarious, often startling, its deadly seriousness and underlying purpose carry a stunning impact. Cloth, illustrated. $2.75.

PAY DIRT

by **J. I. RODALE**

Editor of Organic Gardening

NOW in its sixth edition, PAY DIRT is still one of the most important books published in this country for years. Next to the Atom Bomb, nothing else in the world is so serious as Man's ravishment of the earth that sustains him and keeps him from starvation. Even more than the Atom Bomb, our top-soil could become beneficial to mankind if properly treated. PAY DIRT points the way to proper farming and gardening methods and is guaranteed to "give a case of the jitters to all back yard gardeners as well as . . . farmers who have been playing it the easy way by using chemical fertilizers. It will very well send them back to the compost heap. It also proves that what you and I don't know about the art of composting . . . would fill . . . a book."—THE NEW YORKER. "—brings the all-important world problem of soil conservation into focus for the individual gardener."—THE NEW YORK HERALD TRIBUNE. "—an exciting book, both for the farmer and the gardener."—Richardson Wright, in HOUSE AND GARDEN. PAY DIRT is a manual for everyone who wants to adopt Organic Gardening methods. *SELLING BETTER THAN EVER* . . . Cloth. $3.00.

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ORGANIC GARDENING **EMMAUS, PA.**

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THE ALL-PURPOSE, ALL-SEASON
PRECISION-BUILT POWER GARDEN IMPLEMENT

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$179.50
F. O. B. FACTORY

NO plowing, no discing, no harrowing! Just guide the "Handy-Man" tiller through the garden and your soil is completely conditioned for planting in *one operation.* What is more, it cultivates and weeds throughout the *entire* growing cycle of the plant assuring healthy, hearty crops. It's the perfect garden implement for the organic gardener.

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Rotary action breaks up earth from 1 to 5 inches, completely aerating the soil. Fertilizer and compost mixtures are worked into the soil where they do the most good instead of staying on the surface or being plowed under in a useless "lump."

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Power take off (optional) quickly converts the "Handy-Man" Tiller to an Auxiliary Power Unit, Lawn Mower, Lawn Broom, Rotary Snow Plow, Power Sprayer or Tree Pruner. Trenching and Hilling tool available. See your "Handy-Man" dealer now!

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THE ONLY MAGAZINE DEVOTED EXCLUSIVELY TO ORGANIC GARDENING

Organic Gardening

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GARDEN RECLAIMED BY COMPOST

May 26, 1948.

Gentlemen:

About 1946 I had given up trying to raise anything but a few azaleas and Amaryllis which did not seem to become diseased or bug eaten in my soil which seems to be 99.9% sand. I used a well known commercial fertilizer and water (Vigoro), and, the soil was full of root knot, (Nematodes).

In 1947 I planted a few zinnias, marigolds, petunias, and I do not remember what else, but I decided on no spray and no fertilizer except bone meal, sheep manure, lime, and leaves. Well, to my surprise the garden was not a total failure, although I did burn some stuff with the sheep manure, used too much I guess. The root knot

Coming Events . .

•

1. August 5 to 8—The Second Annual Long Beach Flower Show, Long Beach Municipal Auditorium.

•

2. September 10 and 11—The Dahlia Society of Ohio at the Higbee Company Store, Public Square, Cleveland, Ohio.

•

3. September 11 and 12—Annual Convention and Show of American Begonia Society, Glendale, California.

•

4. October 23—Pennsylvania State Horticultural Show, State College, Pennsylvania.

Life Subscriptions

The *Organic Gardening Magazine* is desirous of raising $7000.00 for a particular project and to raise this money is willing to offer 200 life subscriptions at $35.00 each. For this amount you will receive the magazine for the rest of your life. It is not only a fair offer but you are relieved of all the detail work of renewing from year to year.

This offer is available to the first 200 who apply.

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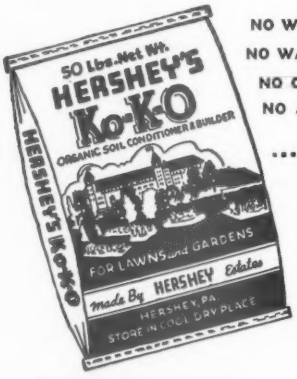
Now Is The Time!

Condition your soil for this year's lawn and garden

Insure garden success! Start right! Condition the soil! Healthy, vigorous-growing plants begin with good, fertile soil.



NO WEEDS
NO WATER
NO ODOR
NO ACID

HERSHEY'S

Ko-K-O

ORGANIC SOIL BUILDER AND CONDITIONER

FOR LAWNS AND GARDENS

- Apply Direct to the Soil
- Mix in the Compost Heap
- FEED TO EARTHWORMS

An essential material for the Organic Gardener . . . . A slow-acting, long-lasting energizer that increases and replenishes the organic content of the soil . . . . Improves soil texture . . . . absorbs and retains plant-nourishing moisture . . . . helps decomposition of soil break-up into humus . . . . binds sandy soils . . . . loosens clay soils.

WHAT IS HERSHEY'S Ko-K-O?

Cocoa bean shells and other parts of the cocoa bean are expertly blended and sweetened to produce a natural, organic material furnishing a steady source of humus for the soil.

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HERSHEY ESTATES
HERSHEY, PENNSYLVANIA

ruined the zinnias and nothing did very well, but to my surprise things did about as well as when I used the Vigoro.

So now it is 1948. I have learned to make compost, and although I use a lot of it when only half made and my garden plot is full of small sticks, trash, leaves and junk that did not fully rot; nevertheless, there are a few earthworms, and my compost pile is full of earthworms. I have five tomato plants one of which has ten green tomatoes on it. All five are still looking good. Tomatoes was one thing I had decided was impossible to raise down here unless you had new land.

If you could have seen my garden in 1944 and 1945, and then see it now in 1948, well, if you never heard of organic gardening you would begin to believe in it. The garden is still not a great success mostly because of the fact that I cannot make enough compost fast enough, but the improvement is astounding.

Henry G. Coleman,
P. O. Box 1326,
Mobile 7, Alabama.

—o—

NATURE'S WAY

May 17, 1948.

Gentlemen:

I am a faithful subscriber and organic gardener on my four acres of the poorest soil (pure sand) in what was formerly the forest fire belt of Long Island. As I cleared the land from scrub pines (nothing else could grow on it), I have used the organic method exclusively—no poisons, no sprays from the very beginning. Now in only 3 years I can clearly see the benefits of Nature's way compared to the Devil's own way of poisons and shameless destruction of our friends, the insects and birds.

(No address)

—o—

HIGH VITAMIN PLANTS

March 12, 1948.

Dear Sir:

Vitamin processors have found that the young tender vegetables are very

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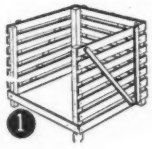

Only **$18.75** *complete plus shipping charges.*

Write for FREE literature describing Wil-gro Compost Box, information about making compost with earthworms, and other garden aids.

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If you want a "show place" lawn just write us and receive FREE information about DRUMCLIFF Lawn Grass Seed—how to have a better lawn at lower cost—how a thick, heavy turf of deep-rooted perennial grass

INHIBITS WEEDS AND CRABGRASS

Early Autumn is the ideal time to improve your lawn—repair summer damage—or build a new lawn with DRUMCLIFF blend of selected perennial varieties containing new *certified* ILLAHEE Creeping Fescue; supply limited. Not sold in stores. We ship pre-tested, weed-free seed direct to you with full instructions for planting and care. Write TODAY for lawn information FREE No obligation; a postal card will do. Address: **DRUMCLIFF COMPANY**, Dept. 639, Towson 4, Maryland.

Your Own ODORLESS FERTILIZER FACTORY

Now, with ActivO, it is possible (without chemicals) to make your own rich fertilizer—better than manure; better than you can buy—from garbage and other such materials. Make it without odor. And make it QUICKLY. EASILY. CHEAPLY.

It is possible to reduce garbage to humus in 2 to 6 weeks! You may do it in an open heap, or in compost cabinet—in a tiny city backyard; even in basement or garage!

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LOW COST: A little ActivO goes a long way—**No. 25 size, only $6.79, prepaid, treats up to 3½ tons of waste.** With ActivO you can make fertilizer even from corncobs and sawdust, yet ActivO will not destroy earthworms or other beneficial soil agencies—for using ActivO is only using **Nature,** greatly intensified.

Only ActivO will do all this. You don't need to buy special "soil activators". Applied direct to soil, ActivO conditions, fortifies and activates it; gives **life** to jaded soils.... ActivO also reduces odors in outdoor toilets while turning waste into easily, handled, ash-like humus.

You will want to try this unusual product. Get some ActivO TODAY. If your regular dealer doesn't have it, use this coupon. DON'T accept substitutes!

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(Northeastern states, address ActivO-SOILSERVICE, Box 131, Townsend, Mass.)

Inclosed is ..... for $ .....
(Please add 10% West of Rocky Mountains)

Send the following:

☐ Dozen No. 1 cans ActivO for Cabinets or for activating soils only (each treats 50 to 100 lb. waste) at $3.95 doz., prepaid.

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☐ .....

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ADDRESS .....

P. O. and State .....

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(Glory of the Snow)

Blooms very early, often before the spring crocus. These hardy, attractive little flowers grow from 5 to 7 inches high, with clusters of 5 to 15 blooms per stem.

Luciliae—sky blue, white throat.
Rosea—new soft pink.
Alba—rare pure white.
25 for $1.00; 100 for $3.75
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Write now for our friendly catalog listing daffodils, hyacinths, iris, tulips, and many rare tiny bulbs. It's different.

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AMERICA'S FINEST TILLAGE TOOL

- DUAL WHEELS
- CUTS 26-INCH SWATH
- 10 H.P. ONAN ENGINE

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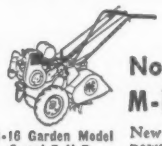

G-16 Garden Model 5 and 7 H.P.

No Tine Breakage on M-E ROTARY TILLERS

New G-26 has wider cut, more power, yet handles like a charm! 10 H.P. Onan engine—2 cylinder (opposed), 4 cycle, air cooled. Handlebar controls—all in easy reach. Special clutch for self-powered turning — patented tine assembly—no tine breakage. Everything about these M-E Rotary Garden Tillers helps to make garden work easier, quicker . . . to prepare a perfect seed bed . . . to guarantee a 22% to 51% increase in crop yield . . . to rebuild soil Nature's way. Send for folder now—learn all about the outstanding features of M-E, the finest of tillage tools!

WA-36 Wheel Model Any Tractor.

FA-36 Ford Attached

Milwaukee Equipment Mfg. Co.
Dept. OGS, So. Milwaukee, Wisconsin
Please rush complete information on M-E Rotary Tillers

Name _____
Address

M-E **ROTARY TILLERS**
MILWAUKEE EQUIP. MFG. CO.
So. Milwaukee, Wis. U.S.A.

low in vitamin content, and that the best source of supply lies in the tough, fully matured vegetation. By the same process of reasoning, the mineral content of the young plant should also be low in the essential elements. Plants absorb minerals during the entire growing period, and must of necessity store them as they do not give off any products except water and products of respiration. It is also my opinion that it is the mineral content that produces hardening or toughening.

Of course it will take much longer to break down such plant material, but the object of the game is to restore organic minerals, vitamins, catalysts, etc. to the soil, and I believe that one mature plant contains more of these things than a hundred times that amount in tender vegetation.

Organic Gardening is THE magazine so far as I am concerned, enjoy every word on every page. Have made many converts to it here by showing nurserymen and truckers that 'Things that won't grow in this section' really do grow and do well under organic methods. One 'specialist' claimed that asparagus could not be grown here and could not be convinced until some of our friends brought him to my garden and showed him my bed, plants eight feet tall without bug, worm, or blight. And all without chemicals, sprays, or other poison.

J. H. Daughtry, D. C.,
219 West 19 St.,
Houston 8, Texas.

—o—

ORGANIC FARMING IS A PLEASURE

June 12, 1948.

Gentlemen:

Gardening used to be such a pain in the neck—and back. It was all work and no play. Now thanks to you it is a pleasure. We look forward to the time to plant each item and then watch its growth not worried about disease or pests. Our old poison dusts and sprays and fertilizers are forgotten and not for the world would we put them on our plants or

land. Our fruit trees are healthy and growing. Some have put on four times the growth that they made under the old methods.

We not only cut out the poisons and fertilizers but most of the machinery also. Our ambition, at one time, was to have a completely motorized farm, just like all the farm papers were advising us. Now we just keep two horses, and they stay in the pasture most of the time. Our cattle stay on pasture the year round and only get high quality hay when they want it instead of the synthetic "balanced rations" that we used to feed, also because the farm papers all advised it.

We have lots of bees and birds. People who use DDT and other wonderful things wonder where the bees and birds have gone.

Arnold G. Ingham,
Glenwood Forest,
Wellville, Virginia.

—o—

SNAILS, SLUGS AND CUTWORMS

May 24, 1948.

Dear Editor:

Thirty years ago when I had a homestead in northeast Oregon adjacent to a forest reserve where there was range stock and no fences, all I had to protect my garden was a three-wire (barbed) fence. I certainly watched that fence. One day I was called away and I didn't return until

FEED YOUR SOIL!

Use ActivO Ruhms Phosphate Rock Earthworms and Compost Limestone all Great Soil Conditioners. Send for facts (3c Stamp appreciated). Or order direct from ad.

ACTIVO

No. 1 size (for Compost Cabinet) $3.95 (doz.)
No. 2 size (treats up to 450 lbs. waste) $1.00
No. 7 size (treats up to 1800 lbs. waste) $2.00
No. 25 size (treats 3 tons waste) $6.79

EARTHWORM CULTURES

3 containers $2.50; ½ Gallon $6.00; 1 Gallon $11.00

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100 lb. bag $2.50; Ton $32.80 F. O. B. Townsend

SPECIAL COMBINATION

No. 25 size ActivO plus 100 lb. Compost Limestone $6.79 shipped freight or express collect. ACTIVO No. 50 (treats 6 tons waste material) $9.95 shipped freight or express collect.

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Hyper-Humus

THE NATURAL SOIL ORGANIC

Mixed directly into the soil, **HYPER-HUMUS** will produce more abundant vegetables, gorgeous flowers and rich green grass. **HYPER-HUMUS** is the natural soil organic, teeming with beneficial bacteria. No weed seeds.

BETTER COMPOST

Arrange grass, leaves, garden refuse and other waste materials in layers 3 inches deep; spread **HYPER-HUMUS** 1 inch deep over each layer.

Free folder on request
See your Dealer or write

HYPER-HUMUS CO.
Box 19 Newton, N. J.
West of Miss. R. out of our shipping zone.

FALL SEEDING WITH Scotts T. M. REG.

IS BEST!

This fall you can fix up a summer ravished lawn or build a new one with greater ease. **Scotts** Lawn Food plus Weed Control kills the weeds and adds nourishment, and **Scotts** Seed is unsurpassed for making a thick, velvety carpet of grass. But start right with the "know how" of our LAWN CARE bulletins. For a free 2 year subscription, drop a card to ..

O M Scott & SONS CO.
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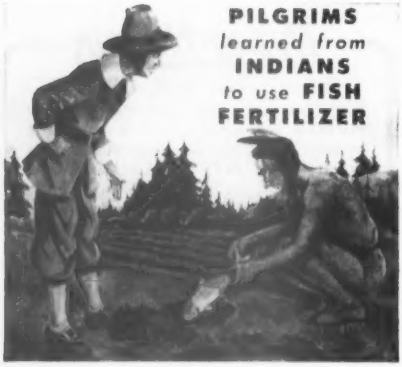
Also Ridgefield, N. J. and Palo Alto, Calif.



PLANTS Need A BALANCED DIET just as YOU do

Plant health, like human health, depends strongly upon a balanced diet. From camellias to cabbages, all plants thrive, resist diseases and pests when ALL the plant food essentials are available in the soil.

Modern science has proved that plants need not only nitrogen, phosphorus and potassium—but also 14 other elements in small but essential amounts, for perfect health and growth. And no one can KNOW that **ALL 17** vital essentials are in his soil — without a costly **complete** soil analysis.

The low-cost method to be SURE your soil has **ALL 17** essentials is to add the fertilizer that you KNOW does contain them all—in available, soluble form.

ATLAS *FERTILIZER EMULSION*

contains ALL 17 essentials — all soluble

COMPLETE contents of ATLAS FERTILIZER EMULSION

1. Nitrogen
2. Phosphorus
3. Potassium
4. Calcium
5. Magnesium
6. Iodine
7. Chlorine
8. Boron
9. Copper
10. Iron
11. Manganese
12. Zinc
13. Sodium
14. Silicon
15. Aluminum
16. Strontium
17. Titanium

is a POWERFUL CONCENTRATE, made from the non-edible (richest in fertility) parts of sea-going fish. It is rich in natural "life factors" without which no plant or animal long survives — including the complete B-complex vitamin groups. It contains more plant food essentials and valuable trace minerals than any soil, compost, manure or other fertilizer.

ALL the elements in ATLAS FERTILIZER EMULSION are quickly available for plant growth — a fact of vital importance as no element can be used by any plant unless it is water-soluble. Thus ATLAS FERTILIZER EMULSION can enter the plant root-hairs directly.

ATLAS FERTILIZER EMULSION in your soil or compost, "starts a chain reaction" which multiplies its benefits. It strongly stimulates earthworm activity and reproduction — and multiplies the nitrogen-fixing soil bacteria which manufacture fertilizer for you.

ATLAS FERTILIZER EMULSION is 100% ORGANIC, plus a required minimum of preservative, which is more than neutralized by either the alkali in your "city water," or by a very small part of the lime you use in compost. Highly concentrated, it should be diluted one pint to 80 gallons of water for gardening — one pint to 20 gallons for compost. Apply with watering can or hose applicator.

You will be delighted with the QUICK results — will KNOW you are replacing soil deficiencies.

By mail only for introduction.

For sale at garden supply stores.

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1 Drumm St., San Francisco 11, Calif.

Please send your dealer's name & address.

We will ask him to have ATLAS F. E. in stock when you need more.

PINTS - QUARTS
GALS. - 5 GALS.

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Please send me additional information . . . . . ☐

My name_____

Street or Route_____ City_____ State_____

My garden supply dealer is—

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His address_____ City_____ State_____

FISH — America's First Fertilizer

about 2½ hours after dark. I took my gasoline lantern and went out to inspect the garden which was about half grown. While walking between the rows of peas, something attracted my attention on the tops of the plants where the leaves are most tender. They proved to be cutworms taking a free lunch. I decided to try picking them off and putting them in a can with a little kerosene in the bottom. With a little practice you can see them at a glance and by looking over the garden three nights I got practically all the cutworms. This also holds good for snails and slugs.

I now use a flashlight and it works better than the lantern. I have used this method for 23 years and it still works.

R. H. Bonewitz,
P. O. Box 211,
Stanton, Calif.

—o—

FERTILIZERS AND INSECT PESTS

June 9, 1948.

Dear Sir:

I am raising potatoes from good seed. Last November, I applied 2 inches of my compost which was made very carefully and turned out a good dark color. When planting the seeds in April, I added another 2 inches of this compost. I have ten rows of potato seeds planted.

Yesterday, I visited my place and I was amazed to see that the plants in some of the rows were tall and in blossom, and I found little black insects (flea beetles) in some of the leaves. I also noticed that two of the end rows, were only one-half as high as the others. My son went down to examine these two rows and he found a little worm circled up on one of the leaves, but very little insect damage. I asked my gardener how this came about. He replied that he had put fertilizer on the other rows but none on these two rows, as he had none left. I asked him what fertilizer, and

FREE!
BIG FULL-COLOR
ROSE BOOK

BIG 48-page FALL CATALOG shows in FULL COLOR—hundreds of newest and most popular roses and perennials, including All-America Prize Winners. Catalog also provides garden hints, helps planning, shows how to save money. Experts agree, **Fall is the Best Time to Plant Roses.** All roses offered are **Guaranteed To Live And Bloom In Your Garden.** Supply limited, so mail coupon today. **Jackson & Perkins Co., 225 Rose Lane, Newark, New YORK.**

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World's Largest Rose Growers

Send me, FREE, your new FALL 1948 Catalog.

Name_____

Address_____

City_____ State_____

Burpee
Giant Trumpet
Daffodils
4 BULBS 25¢

The finest Yellows, Whites and Bi-Colors, mixed—long trumpets, largest flowers on long strong stems. Guaranteed to bloom. Special low price, worth far more! Sent postpaid: **4 Bulbs 25c; 17 Bulbs $1.; 100 Bulbs $5.** Order Now!

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Giant Trumpet Daffodils as described above. **17 Bulbs** $1
Large Flowered Crocus All best colors mixed. **65 Bulbs** $1
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Fantasy Parrot Tulips Most beautiful of all tulips. **12 Bulbs** $1
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Any 3 $1 Lots for $2.75; Any 6 for $5.00, postpaid.

Burpee Fall Bulb Book FREE
This is the year to plant! See the many new kinds in this book. Write today!

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he replied 5-10-5. I did not know there was any of this on my place. Will the earthworms and bacteria be killed by this fertilizer? What shall I do? Could these potatoes be used by my family, or, will I sell them?

Mrs. R. J. McKean,
71 Broadway, New York, N. Y.

—o—

ROCK MULCHING MAKES GARDENING CHILD'S PLAY

July 1, 1948.

Dear Sir:

I thought you might be interested in hearing about our experience with rock mulching. Last spring we started using as a garden a piece of ground that had been ploughed up the preceding fall for the first time. Since it was on a sloping hillside, we thought it would be a good place to try out your stone mulching idea. The ground was hard and very difficult to work with. We planted almost all the seeds in virgin soil, but did add a little soil from the woods on the last row or two.

Then we placed thick layers of leaves between the rows and topped these with stones. Our crops were fairly good, considering that we had fed them scarcely anything at all.

What I wanted to tell you, however, is that this spring, when everyone was complaining that it was too cold or too wet or too something or other, we found that planting that part of the garden was child's play. All we needed to do was put the fork in and turn the ground over. Its consistency was wonderful. Practically all the leaves had disappeared from under the stones and the earth was full of worms. Now our neighbors are bemoaning the fact that with the incessant rains, their crops are rotting in the ground, but ours are thriving beautifully. Since we had added practically nothing to improve the soil last year, it seems to me that this is definite proof of the value of a rock mulch.

Mrs. Sylvia S. Vanselow,
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Mother nature also uses earthworms in her soil—and so must you. We supply the small type of earthworms that deposits almost all of their castings beneath the surface of the ground among the roots of the plants where it feeds the plants. And those castings which the worms do deposit on the top of the ground are so small as to be a help rather than harmful to the lawns.

K-K Super-compost and our small earthworms make a wonderful combination in lawns, gardens and all other soils.

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The Potash-Protein Relationship

IN the previous issue of this publication the importance of protein in foods was described. The work of J. E. R. McDonagh, M. D. of England in connection with a theory of the formation of viruses within the body was detailed. His investigations seem to indicate that where the nutrition of a plant or body is defective the protein over-expands which "results in a portion of the protein being broken off, and this broken-off piece is a virus." All our living tissues, our muscles, flesh, bones, skin, hair, our organs—the heart, liver, etc. are made of protein. The vitamins are either all proteins or associated in their operations with them. The enzymes that digest our food, that act as catalysts in the body processes are exclusively protein. Thus, it is shown how important it is to have sufficient proteins in our diet, as well as proteins of good quality. Yet we find that in our modern scientific agriculture there has been an insidious and gradual decline in crop proteins. In the past ten years the quantity of protein in the feed grain raised in the corn belt alone dropped from about 9.5 to 8.5 percent or a reduction of over 10% in only ten years time. This is of profound significance because it is associated with artificial agricultural practices, i.e., the use of chemical fertilizers, the growing of hybrid corn, etc. The purpose of this article is to show the effect of potash as a fertilizer, in producing an over-supply of carbohydrate and a reduction of protein. Its object also is to attack that smug formula of those of the N, P, K mentality, that is, nitrogen, phosphorus and potash (K). We must handle potash with care. While it will not exactly explode under careless handling its ultimate effect may even be far more catastrophic.

ALBRECHT'S ARTICLE

Professor William A. Albrecht, Chairman of the Department of Soils of the University of Missouri, has written an article entitled "Our Teeth and Our Soils," which was published in the December, 1947 issue of the *Annals of Dentistry*. It indicts potash as the one element of the NPK fertilizer formula which effects an increase in the carbohydrate content of the plant and a resultant decrease in the protein. He says that "calcium is associated with the synthesis of proteins by plants, while potassium is associated with their synthesis of carbohydrates."

Albrecht describes also a climatic factor in the soil content of potassium. In soils where rainfall is low proteinaceous and mineral-rich crops and foods are possible but as rainfall increases the protein production is not so common due to the fact that because of the leaching down of the calcium more than of the potassium, the ratio between the two becomes more divergent, that is, less of calcium and more of potassium. Since calcium helps protein formation, and potassium the carbohydrate, one can see the consequences of the disturbance of this ratio. In regions of high rainfall, the soil needs of lime should therefore be looked after.

Albrecht says, "Soils naturally

highly weathered are no longer well stocked with nutrient mineral reserves ... Such soils must of necessity give crops and foods which are mainly carbohydrates and are therefore deficient in proteins and minerals. But quite the opposite, the less weathered soils under low annual rainfalls are mineral-rich ... Hence they give both proteins and minerals along with the carbohydrates in the plants grown on them. In these facts we have the suggestion that any soil undergoing exhaustion of its fertility, whether by Nature or by man, is bringing about a change in the chemical composition of any plant species growing on it. This change means that the plant species become more carbonaceous, less proteinaceous, and less mineral rich."

DESERT SOILS

Many persons wrongly believe that our Western semi-arid soils are infertile. As Albrecht has shown this is not so. Where irrigation is applied the land answers with mineral-rich crops. Recently I was on a transcontinental train going to California. In the club car was a young English boy with his tutor and governess. We were passing some arid-looking stretches in New Mexico. The tutor said to the governess: "This is a very infertile soil here." Having become acquainted with them on the trip, I explained that on the contrary this soil lacked weathering experience formerly and lacks water today to give forth bountiful crops. He looked at me rather peculiarly, but just then Nature came to my rescue. We came to a little lakelet, not more than ten by twenty feet, but it had large, wide-spreading trees growing on its banks. In contrast to the scraggly things we had just seen there was no comparison. It was the same soil but had the benefit of added water. So I said "Do you see what I mean?" And they saw, their eyes sparkling happily over a new fact learned.

Professor Albrecht, in his paper, describes how Dr. E. R. Graham at the Missouri Agricultural Experiment Station experimented with the growing of soybeans with a low, medium and high ratio of potassium to calcium in the soil. As the potassium was progressively higher, says Dr. Albrecht, "these three soils represented increasing encouragement for the plants to produce carbohydrates more than to synthesize proteins. This narrowing ratio of calcium to the potassium resulted in an increase of vegetable bulk by one-fourth. Such an increased tonnage would warrant agronomic applause. But this increase in vegetative mass represented a reduction in the concentration of protein by one-fourth, a reduction in the concentration of phosphorus by one-half and a reduction in the concentration of calcium by two-thirds of that in the smaller tonnage yield." When the public buys such a food he gets bulk and pays for it, when the organic farmer and gardener produces a crop he gets a more concentrated nourishment, a more healthy nourishment.

HARD AND SOFT WHEAT

Dr. Albrecht says further, "As our soils are being exhausted of their fertility by cropping under the intense economic pressure now being put on them, a single grain crop like wheat is producing itself of less protein and of more starch as time goes on. We say, 'wheat is becoming soft where it once was hard.' In our near-colonial days we produced hard wheat in the valley of the Genesee River of New York. That wheatbasket, or breadbasket of this country at that time, made Rochester the 'Flour City.' Today Rochester is still the 'Flower City' with its many parks. But the 'hard' wheat has moved westward across the United States, while the 'soft,' starchy wheat—which we seemingly desire for our pastries—is crowding along in its wake. 'Soft' wheat has now gone so far west that even in Kansas the millers and bakers are complaining about its low protein content and their low volume of bread output per unit of flour used. The farmers of Kansas, however, are de-

lighted with their high volumes of output as bushels per acre that are possible when the plants collect only carbohydrates instead of converting these into protein of much less bulk as plant output.

"Corn, too, is doing less in its synthesis of proteins. While we have pushed up the volume of its output as bushels per acre by hybrid vigor, we have not realized that the concentration of protein in our corn grain was dropping from a mean figure of about 9.5 percent to only 8.5 percent during the last ten years."

HEALTH TIED TO PROTEIN

I am going to let Professor Albrecht talk because what he says makes sense. "As we mine the soils of their fertility so that the output by one crop as bulk goes down, we search the world and bring in some exotic crop because it can make tons or bushels where the preceding crop failed. If this imported crop makes vegetative tons where the others failed, it must be putting out its products with less of soil fertility in them and therefore they must be more carbonaceous and probably of deceptive nutritional values.

"As a consequence of the lowered protein concentration in grains and grasses under soil fertility depletion, we have not only had the westward march of 'hard' wheat, and the clamor for more 'grass' agriculture, but also a westward march of our protein in beef and lamb. Chicago is no longer the major beef cattle market. That honor now rests on Kansas City . . .

"Here, then, in the soil fertility is the pattern of the nutritional values of our foods and feeds pointing out their lowered concentrations of minerals and proteins. Here is the lowered power of growth and lowered capacity for reproduction. Life is not passed from one fat globule to another, nor from one starch grain to another, but only from one protein to another protein molecule. Can a dentist see good permanent teeth being laid down in the jawbone of a foetus (unborn child) when the mother's diet is deficient in minerals and protein? Can he find sound teeth in school children when carbohydrate bulk predominates in their diet because of its lesser cost and easier storage . . . ?

"From all of the data of the inductees into the Army and the Navy there is the suggestion that more of our so-called "diseases" may well be statistically mapped for the United States and compared with the map of the soil fertility. If all other body irregularities as well as those of the teeth were so viewed, it is highly probable that many of our diseases would be interpreted as degenerative troubles originating in nutritional deficiencies going back to insufficient fertility of the soil."

As we go further into this subject, we will find that every chemical element has qualities and characteristics that must be studied. Unfortunately the average chemist studies chemicals as chemicals, and does not spend too much time on the effect of each on the human body or on the bacterial and other microbial life in the soil. In the soil one can be liberal with the application, for example, of calcium, magnesium and phosphorus, but from what we have learned about potassium, *there* is an element with regard to which we must go easy. The same holds true, perhaps, for inorganic nitrogen. There is danger in any "unbalance" or intemperance. Here is a field of investigation that is crying for an Albrecht or an Einstein, to put every chemical element in its proper place, for some of them are dynamite.

SCHRUMPF-PIERRON

Now let us go a step further to show what a real villain potassium can be when it is in oversupply. We will talk about the researches of Professor P. Schrumpf-Pierron, whose work is written up in the *Bulletin de l' Institut D'Egypte,* Vol. XIV, 1932 and Feb. 15, 1932 and others. He talks about the rarity of cancer in Egypt where malignant cases are only about one tenth that of Europe. What is the

cause? After exhaustive studies and research the Professor came to the conclusion that it was due to too much potassium and too little magnesium in the foods of Europeans. On the other hand in the soils of Egypt the conditions are reversed, that is, more magnesium in relation to the potassium.

There seems to be a definite relationship between magnesium and potash wherever it is found, whether in the soils, rocks or other places. Where there is an oversupply of potash there is always an undersupply of magnesium and vice versa. Schrumpf-Pierron studied the cancer statistics for France in relation to the rock structure underlying its soils. It worked most uncannily. Wherever he found an excess of potash there he discovered less magnesium and more human cancer cases. Wherever he observed a minimum of potash he found a maximum of magnesium and less cancer cases. This means that people who ate food raised in certain soils that obtained their nutriments from the rocks which underlay them, get certain elements into their foods because of this. Such a condition would apply more to France than to the United States because in a country like France there would be more of a tendency to consume foods near the point at which it is raised. But in the United States with our more advanced industrial condition where even the poorer peoples will eat winter vegetables raised in California, Florida and elsewhere, and a great deal of citrus foods, etc. and meats that are shipped long distances, local deficiencies and unbalancings of nutritional elements may tend to be corrected to a certain extent.

The work of Schrumpf-Pierron *must* be investigated by the medical and agricultural experts. Possibly special foods could be raised for cancer patients, rich in magnesium and low in potassium under the observation of the medical profession. An interesting remark by Schrumpf-Pierron which should be of interest to farmers and vegetable gardeners is "magnesia is an antitoxin for potash—an excess of which, as is the case for soda, (users of nitrate of soda please note) can result in sterile soil." Here is a medical doctor interested in the soil and how foods are grown. We have hundreds of M. D.'s on the subscription rolls of our magazine but there should be more.

In the winter of 1947 a meeting was held in Paris to honor Professor Antoine Bechamp, an opponent of Pasteurs. It was presided over by the Earl of Portsmouth who is one of the most vigorous advocates of the organic farming movement in England. At that meeting the Schrumpf-Pierron magnesium-potash relationship was mentioned by a Dr. Paillard of Paris who said: "Potash was said to be a wonderful manure, all the fields in the world are saturated with it; the result is, nowadays, the ground is progressively exhausted and the nations are starving. Potash neutralizes the magnesium which is necessary for antidoting the poisons of food; the lack of magnesium generates fear. We are living in a century of fear. On the other hand, I remind you that in all cases of tuberculosis the concentration of potassium in blood is about twice the normal."

DOLOMITE

We have seen that there are two elements that act as buffers against potassium and they are calcium (limestone) and magnesium. There is a certain kind of limestone which is extremely rich in both magnesium and calcium. It is called dolomite or dolomitic limestone and is an extremely abundant material. My own farm is underlaid by dolomitic rock but that does not fool us. Since we are located in a region of relatively high rainfall the surface minerals tend to leach downward and must be replaced. Besides compost we apply dolomite and finely ground phosphate rock.

One of the reasons why potassium may become dangerous in oversupply, is that it is radio-active. Dr. Ehren-

fried Pfeiffer in his book *Bio-Dynamic Farming and Gardening* shows how this quality in potassium will affect nearby plants. He says: "Stoklasa shows that potassium (in sealed test tubes hung over growing plants) alters the rate of growth of the plants. We should like to add that we have been able to make this experiment, the validity of which we are able to confirm by having obtained corresponding results. Ried shows that the presence of potassium and other salts in the vicinity of animals is able to have a far reaching influence on their growth and above all on their reproduction. And there are numberless experiments which demonstrate the influence of irradiated and non-irradiated metals, in their effects at a distance upon the development of bacteria cultures. Only the Italian works of Rivera and Sempio are cited here."

Again Dr. Pfeiffer gives another instance of danger in connection with the use of potassium. He says: "That an overbalance of salts, in the case of mineral fertilizing, can have a harmful effect on the food, has been shown from various studies. Reference has already been made to the observations of the Swiss researcher, Dr. v. Grünigen. They point to the danger of a too high potassium content; this comes from the tendency of the plant to consume an over abundance of potassium. The data of Professor Rost of Mannheim go further in presenting the danger of a surplus of potassium. Rost demonstrated by feeding experiments that, through the feeding of potassium, thrombosis as well as gangrenes could be experimentally produced. From this noteworthy treatise the following is cited: ... But now I made, in connection with the potassium-nitrate fed animals, an observation which is extraordinarily interesting, for they showed a tendency, a pronounced inclination in the successive generations toward thrombosis. ... Obviously these phenomena appeared more pronounced in the second generation than in the mother animals. Rost testifies that in recent years, thrombosis has increased also in the human being up to four times its earlier prevalence."

Pfeiffer says further in his book, "The licking disease of cattle—cattle suffering from mineral deficiencies, chiefly of calcium, start licking and gnawing at everything, stanchions, mangers, wooden posts. (The writer observed in Switzerland and Holland the licking illness occurred chiefly on farms which were onesidedly treated with chemical fertilizers, particularly where an excess of *potassium* was present."

Professor Firman Bear of Rutgers College says in his textbook *Soils and Fertilizers* "Marked injury to vegetation has been noted in the vicinity of cement plants as a result of the large amounts of soluble *potash* in the dust that is deposited on nearby vegetation."

Dr. M. S. Anderson of the United States Department of Agriculture—Plant Industry Bureau was quoted in the December 18, 1946 issue of the *Pathfinder* as saying, in connection with the compost-chemical controversy: "I believe in replenishing the soil with compost but it works better when phosphorus and nitrogen are added." In general, he considered it a problem more of "how much" than of "what." But he admitted using *potassium* chloride to spur potato-growth may taint the potatoes with chlorine —harmfully." Dr. Anderson should study the effect of the potassium also. Note that he said "Nitrogen and phosphorus" should be added and not potassium. All of these references would seem to indicate that a restudy of the potash needs of the plant is in order.

POTASH DRUNKARDS

In studying the manner in which the soil nutrients get into the roots of plants it should be known that this agrees with their different activities. The nutrients get into the soil solution, but here is a common fallacy. They do not all sweep into the roots indiscriminately. The roots show differences and will take certain ele-

ments under certain conditions and in certain quantities, and hold down others. But potash, he's a bold fellow and will force his way in. You might say that many crop plants are drunkards when it comes to potash. They can't resist it.

Professor Albrecht in the article previously mentioned says in this regard, "From these analytical data we can see that potassium is taken into the plants in largest amounts of all the mineral elements from the soil, while calcium and phosphorus are next in order. In the human body, these same elements are the major three, but calcium is first, phosphorus second and potassium third."

LIEBIG

In the average plant there should not be more than one percent of its ash content in potassium, yet it is quite common to find crop plants containing as high as four percent. This shows how incorrect was Liebig's original experiment which gave birth to the NPK concept, in fertilizing. Liebig took a plant and burned off all the organic matter. In the ash that remained he computed the percentage of potassium and phosphorus. He based the needs of the soil and its fertilization on those amounts. He knew nothing about what we have been discussing in regard to potassium. So, for a hundred years the agricultural practice has been based on his fallacious reasoning, a quantitative reasoning, a reasoning backward from effect to cause. This must be restudied in the light of what we now know and instead of NPK we may have to operate on an NP formula and take care of the K (potash) through animal manures and green matter.

It is most amazing to note how much organic potash is available through natural sources. For example the roots of plants which decay after the crop is taken off contain an extremely high amount of potash, as potash quantities go, or about 1¼ percent.

In a certain stand of 2-year old red clover that was recently examined, it was estimated that over 3 tons per acre were left in the soil as roots. Chemical analyses showed that these residual roots included 77 pounds of potash.

Green matter residues of all kinds contain potash. For example, the potash in corn stover amounts to 1.22 percent, timothy 1.40 percent, red clover 2.11 percent, and soy beans 1.99 percent.

Animal manures contain from 0.35 to 1.% potash and in this respect it is advisable to take into consideration the fact that when manure is left out in the rain much of the potash may wash away, and it is important to conserve this natural, organic potash. The action of carbon dioxide liberated during the breaking down of organic matter makes some of the soil potash available, brings it into solution, without the necessity of adding inorganic potash in the form of chemical fertilizers.

Another method of making use of the existing soil potash is by means of mulches. In the *Journal of the American Society of Agrarian* (Vol. 30-1938-p. 438-9). J. W. Wander and J. H. Gourley show that where there had been a heavy mulch for 22 to 38 years in a pear orchard, upon which no potassium had been added other than that supplied by the mulch, available potassium was very high to a depth of from 24 to 32 inches, although straw contains only one percent potassium. On the other hand, where chemical potash fertilizers have been applied for a period of ten years, very little downward movement of available potassium has been observed. Perhaps the multiplication of earthworms because of the mulch may be the factor in making the potash available. It is a known fact that earthworms, through their castings will increase the soil nitrogen, phosphorus and potash. In the case of potash alone their castings show an increase of eleven times the amount contained in the soil in which the earthworm is working.

Seaweed is rich in potash. At one time potash was made from seaweed on a large scale, but when cheaper mineral deposits were discovered the natural product was abandoned. There are many industrial, vegetable wastes that contain appreciable amounts of organic potash that might be investigated for use as fertilizers.

INSECT INFESTATION

Coming back to the fact that potash has the effect of increasing the carbohydrate content of a plant, it thus tends to increase the insect infestation of the plant. An oversupply of starch seems to attract insects. Professor Albrecht in the article mentioned previously shows a picture of various spinach plants and he says: "Spinach fertilized with more nitrogen and calcium, to make it more proteinaceous (right two rows) was protected against the attack by the thrips insects, while that less rich in protein (left two rows) was not. The picture shows the contrast beautifully.

There are other scientific experiments that have been made at various agricultural colleges to show that undersupplies, or unbalancings of certain nutritional elements in plants bring on the insects. They seem to be Nature's censors, coming in to destroy, if something that is growing is not perfect. Now most organiculturists have discovered for themselves that when they apply a correctly balanced, well-made compost, their insect troubles disappear almost to the vanishing point and now we can see that it is due to the fact that compost gives food to plants in proper balance. Yet, when we make such statements our opponents attack us as cultists who make all sorts of wild claims. If they could only see my apple trees, which without any spraying, for six years, are producing rather nice fruit! But they shut their eyes!

CONCLUSION

It is remarkable what inconsistency there is in our present day civilization, to the detriment of the well-being of that civilization. One person or organization does one thing. Somewhere else is another person or organization that is doing something to break this first thing down, and he or it seems to be operating entirely within the bounds of the law. I would call this nothing less than warring between individuals and organizations. There is no room here to give many examples so I will be able to give only one. In the Holy Land is the Dead Sea. Someone has estimated that it contains potash and bromides in an amount five times the entire wealth of the United States. I do not know how true this is, but we can be sure that it is worth far more than all the oil in the Far East.

Now, on the one hand we have farmers who are tilling the soil, and people who eat the fruits thereof. On the other hand we have organizations that are determined to exploit the wealth of the Dead Sea, the potash which they will advertise and sell to those farmers. Are these exploiters aware of the dangers inherent in the application of their product to the land, and thus to the people? What is going to happen to the bodies and minds of those people?

Let me give another example which ties in with this one. It concerns Germany. On February 4, 1944, Roger Babson, the financial authority, said in his widely syndicated newspaper column, "Some years ago when I was in Switzerland making a study for the *New York Times,* a Swiss scientist said to me, 'Europe will always have trouble with those Prussians. There is something in the soil of Prussia which grows people with that fighting instinct. European peace is unalterably linked up with the minerals of the soil.'" Perhaps that Swiss scientist and Babson were not aware that for a long time Germany had the potash monopoly of the world. There are tremendous deposits of this element in that country which Liebig's original experiment furnished the basis for the building of a tremendous business.

Germany uses three times as much

chemical fertilizers and at least three times as much potash per acre than is applied in the United States. Germany also is practically at the head of the list of Nations in cancer deaths. I believe Holland is first and Germany second. I do not have the exact figures available at the moment of writing but I believe, if I remember correctly, that deaths of cancer in Germany are almost twice as prevalent as in the U. S., based on the per capita of population in each country. Is there any relation between that and its high consumption of chemical fertilizers? Potash can be purchased very cheaply in Germany because of its nearness to the source of supply. Therefore there is a tendency there to its overuse. Is this the reason why the Germans, who eat food that comes from an overpotashed soil want to fight all the time? When we think back of the barbaric cruelties perpetuated by the Germans during the war, can we blame any one particular German for it, or must we blame it on potash? Is the individual responsible? The U. N. is attempting to bring about in Germany a democratic government. It is attempting to make the Germans a democracy-loving people. Will the world ever make the Germans peace-loving until it investigates the soil of Prussia, and the effect the use of inorganic potash has on the warlike character of the German people?

The lives of millions are at stake, especially with the possibility of the use of atomic warfare. Will the U. N. investigate this situation? Will our own Government investigate it? Will the U. S. Department of Agriculture consult with the medical profession and work with them some way to get at the bottom of this potash problem. I pray that they will.

J. I. RODALE.

The Soil and Health Foundation

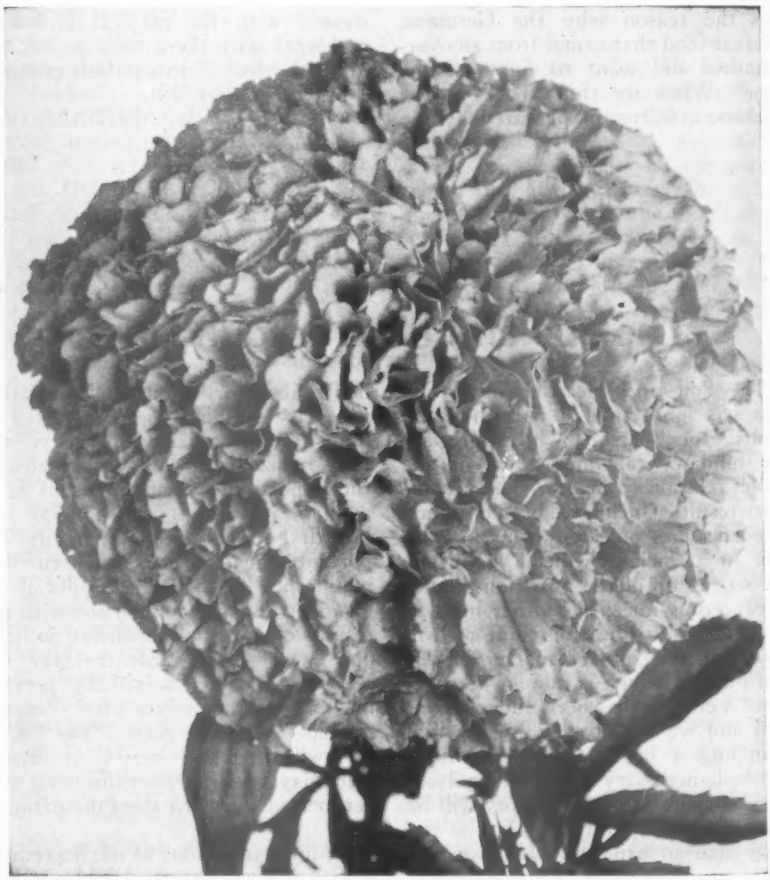
The Soil and Health Foundation now has more than a half thousand contributors, persons who appreciate the fundamental importance of the soil in relation to health. The preliminary results which have been obtained in our studies of earthworms in relation to artificial chemical fertilizers, the setting up of the nutrition studies of cancerous mice, and other matters of interest to the contributors will make up the subject matter of the first bulletin which is now in preparation. A chemist has been added to our staff and we are now setting up and equipping a bio-chemical laboratory in which necessary chemical analyses may be made. This laboratory will be set up in a temporary building in the hope that an experimental farm will soon become available where a permanent laboratory building and other necessary buildings can be erected. I have no doubt that when this need is fully realized, some one will welcome the opportunity of making this farm available as a gift to the Soil and Health Foundation. It is highly important that fertilizer plots be run and maintained to show the results of organic fertilizers in comparison with the results of artificial fertilizers so that our farmers and gardeners may observe them. Here thousands of persons may see for themselves what compost can do to growing plants. The Secretary will be glad to hear from anyone who may wish to contribute an Experimental Farm to the Foundation.

Send contributions to the Secretary, 46 South West Street, Allentown, Pa.

MAGIC in the GARDEN

FIVE years ago, before I knew of organic gardening, I became a composter. Having read a description of how to make a pile I set to work stacking lawn clippings and soil in a heap, wetting it from time to time and the heating process and earthworm population was interesting to an amateur. So important to me did that potential eight or ten bushels of compost become that when we bought a place of our own I took it with me as a piece of property worth moving. It went into a strawberry patch which I established the following spring and which yielded a prodigious crop the following year.

That new place, the average house on the average size city lot, with an average of a foot and a half of subsoil strewn over its entirety and burying the original top soil to a depth that made it almost useless, has been my problem for the past four years. A few chickens have helped by furnishing the necessary manure to compost straw, both from the scratch pen



COMPOST in the SOIL

By R. E. HULSEBUS

and the raked up mulch, and leaves from my lawn and all I could "steal" from the neighborhood trash heaps.

Just a few months ago, through *Organic Gardening Magazine,* I learned a better method of composting than I used theretofore. The piles I first made often took more than a year to decay. Perhaps I turned them once during that time, often I didn't. Last fall, a heap that had been properly aerated was a crumbly powder when I spread it over the flower borders.

Today I have three large piles of compost which should be ready for use in the spring. I expect a bumper crop next year, in a green healthy lawn, in tasty vegetables, and in prize size blooms. A suggestion here, for I have read reports that leaves mat when used in composting. Mine go into the chicken house first where they absorb manure and where used as litter the hens can pulverize them in their day long search for grain. They then sift into the coarser material in the heap and decompose rapidly.

Now for results. That first year I planted the usual annuals—asters, marigolds, sweet peas, gladiolus. Each variety grew a few inches and stopped —because they were set solidly in a concrete of clay. I wasn't proud of my flowers that year, there were not enough blooms to be proud of. Then came the labor of finding that the strip around the house was half subsoil and half broken concrete and crumbled mortar, and that the other borders were little better. It was a case of removing each piece of mortar by hand and often disposing of whole sections of worthless soil to be replaced by other brought in. After three years of applying compost and leaf mould, which trip to the woods is an annual picnic, those borders are in fair condition, a thousand percent better than four years ago. Last year my flowers could claim a bit of pride from their gardener and often some admiration from the neighbors.

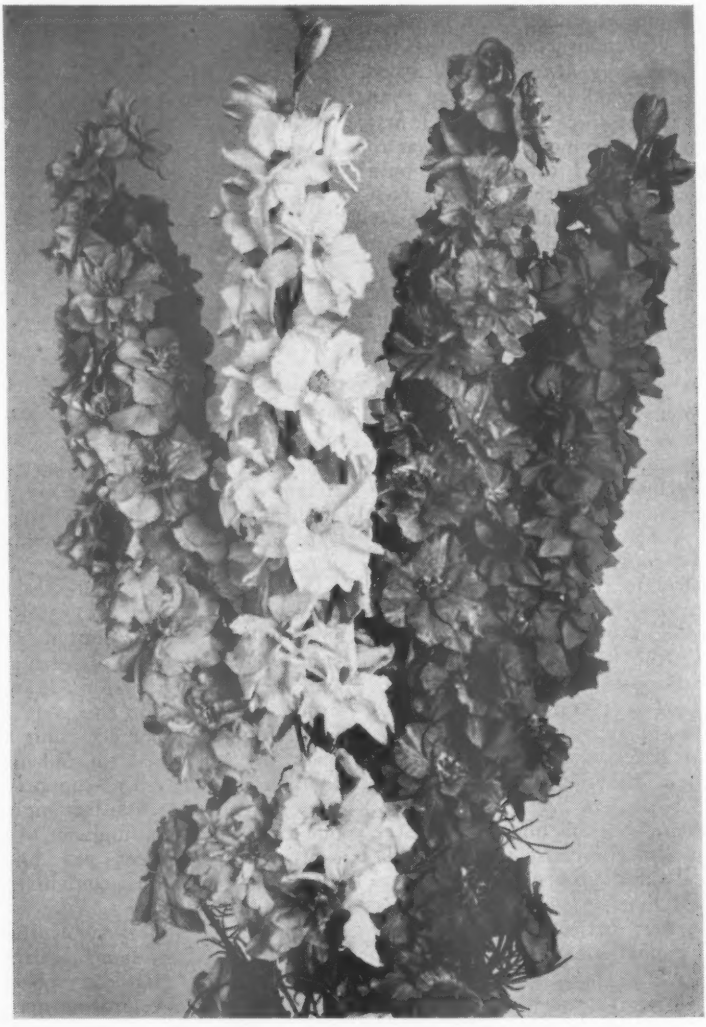
That first year of failure with sweet peas was a challenge. Digging out a four foot square section in a likely spot I removed a foot of earth and replaced it with my home-made soil conditioner, spaded into the layer below. Planted thickly, not according to the book, they grew in a tangled mass up the box shaped web of supports until they were four or five feet high, then put forth such an abundance of bloom that we had sweet pea bouquets throughout the house and many also for our friends.

The rest of the story of this city farmer is much the same. Where even the hardiest plants succumbed four years ago, now are growing many not so easy to coax into vigorous life. A small fork full of compost on my del-

phiniums last year sent them reaching for the sky three or four feet above my head. Too high, you think. They were a lot handsomer at eight feet than the first sickly ones that didn't get more than two feet from the earth. I've a Blaze rose that sent up canes 12 to 15 feet during its second year, happy with compost and bone meal.

I have yet to conquer all my pests by the organic method but I'm going to keep at it. Will give the rock mulch idea a trial this summer. Another thing, a compost heap in the shade of my plum tree last year must have helped the tree bear the burden of a bumper crop. Its roots must have devoured most of the nutrient that leached from the pile.

More success to *Organic Gardening* in the health giving program you are carrying on.



The Physical Structure of the Soil

By DR. EHRENFRIED E. PFEIFFER

WE hear so much about the elements necessary to the soil, potassium, calcium, magnesium, phosphates, nitrates, manganese and trace elements. We also have learned recently much about soil life and humus forming bacteria, about the work of the earthworm. To observe and maintain all these factors is most important if one wants to have a fertile, living soil. However, it is just as important to have a soil structure upon which the soil life can develop, that is, that there is access of air to the soil, the soil is in good drainage. In a soil with poor drainage, for instance, very few humus-forming bacteria can live and no nitrate fixing bacteria will exist, and the earthworms also get lost.

Hardpan in the Soil

Recently we had a few soil samples for testing which possessed everything which is needed in ample amounts, all the elements, even trace elements, and still the owners of these soils reported that the crops were not satisfactory. This is usually the case when a soil tends, for some reason, to a crusted surface formation, or when there is a hardpan underneath. This problem is the same in gardens as in farm fields. If one digs a hole in such soils one will usually observe that a top layer of a fraction of an inch can be removed, particularly when it is dry it can be peeled off. Deeper down we find a crumbly soil to a certain depth, maybe two or three inches, maybe even seven inches; then we find the topsoil separated from the subsoil by a change of color. While the surface layer is dark brown the lower layer is yellow brown or bright yellow; the surface soil might be crumbly, but that underneath might be hard. In some cases one observes that this hardpan is almost impenetrable for water and for plant roots. Particularly in old pastures and in old gardens one will observe that the roots look almost as though they had been cut off when they touch this layer. The mineral resources of these layers are not available. Chemically these layers may still be rich, in most cases rather acid, however, in some cases we have found nitrates and phosphates in higher amounts than in the surface soil but they are not available to the plants. It is, therefore, absolutely necessary to break these layers, to cut through them into the deeper layers which are not influenced by our agricultural methods, which can serve as a source of elements. The gardener, particularly the small gardener, usually digs his soil, and works it through to the depth of his spade. The available elements in the surface soil are washed down and filter into the subsoil. This layer where the elements are stored up is not reached. An expensive, but very helpful method, is the so-called trench farming as it is frequently practiced abroad where labor is cheap. The French people, in particular recommend this method. One digs a trench about two feet deep in such a way that the subsoil is removed separately from the topsoil, then another two foot trench is made next to this one and the subsoil from the previous trench is filled in, then the topsoil, and so one continues until the entire garden bed is dug over. Usually, after this treatment, an improvement in the growth of all kinds of garden crops

can be observed. On a farm, of course, this would not be possible and we have to look for other means.

Subsoiling

The best way to cut through this hardpan is to use a subsoiler; this is a kind of plough with a sharp blade like a thorn, which is pulled through the soil. A heavy tractor is needed to do this, you can figure that the harder the hardpan the heavier the tractor has to be. There are several subsoilers on the market, the best known is probably the Killifer, used on large farms, but there are lighter machines, like that of the Windy Subsoil Company and others. There are also subsoil attachments for ploughs, but we have found that in a gravelly subsoil, or where there are rocks or even small stones, this last type will not work so well. It will pop out of the ground as soon as it hits a rock, or it will dig itself so deeply into the ground, that one has to dig it out. The cutting principle is the best, one should cut as deep as the soil and the available machinery allow, 18 to 26 or even 32 inches might be good; and the rows, for instance should be three or four feet apart. The results which can be obtained by subsoiling are really remarkable. On our farm we had a field with very poor drainage, because of springs coming from underneath. There was no possibility of putting in drainage tiles, since the field is flat and not enough pitch could be obtained, so we started subsoiling the field. While, in previous years, the field was still too wet by the middle of June to be worked, when we subsoiled it in spring, early in April, we had the satisfaction of finding that the field was dry enough two weeks later to be worked normally and oats could be planted. The oats with clover seeded into it are coming up nicely. We had been using a Windy Subsoiler to our satisfaction.

Agricultural experts acknowledge the importance of subsoiling but they do not agree as to whether it pays or not, because it is an additional operation and expense. In my long experience in farming I have found that subsoiling pays under all circumstances. In the case of the field mentioned above, it has paid to do it; it has paid not only for the labor involved but has also paid half the price of the subsoiler, because we will have a crop on a field where we could not have a crop last year. Subsoiling is not only a means of improving the drainage system, but whenever a hardpan is formed it is necessary. It will increase the proper structure of the soil, the aeration of the soil, and then more soil bacteria and earthworms will live and work there, and thus add to the soil life in general. Malnutrition of the plants which have depleted the surface soil is eliminated to a certain extent by this procedure, because the roots can now grow deeper. If one now digs a hole, and studies the soil profile after a year or two one will observe that the roots reach 3, 4, 5 inches deeper than before, and the roots of deep growing plants, like clover and alfalfa, can now be observed to penetrate to 5 and even 6 feet. The plants now take advantage of the layers where elements are stored. Subsoiling can thus be considered as an important additional means to improve the living soil.

In a small garden it might be difficult to bring about such an effect. But, if several people pooled together they might purchase a subsoiler which could rotate amongst them. This would eliminate the expensive deep digging of the trench spading method, as described earlier in the article.

Aeration of the Soil

Organic matter does not decompose into humus unless there is air present. The aeration of the soil is one thing, then there is another interesting problem. If the soil contains iron, and lime is supplied, the iron calcium carbonate will be precipitated. This, particularly in a wet soil which is not sufficiently cultivated and in old pastures, forms a layer from ½ inch to several inches thick. This layer is hostile to all

plant growth, of grasses, clovers, all cultivated plants, even trees when their roots come in touch with this layer usually stop growing and die off. An interesting observation was made many years ago; a farm was given up and trees were planted on the fields. For about twenty-five years the trees grew very nicely, then they all suddenly started to die. The roots of the trees had by that time reached the second hardpan, after penetrating the first, thinner layer, and had touched this iron calcium carbonate layer; this spelled the end for these forests. Now it is a fact that almost every field which is under cultivation, particularly ploughed fields, will form hardpans. The sole of the plough furrow itself, especially if the soil is ploughed while wet, will be smeared and sealed off by the bottom of the plough, and then the hardpan gradually forms there. Some people believe that a deeper ploughing will break this hardpan, however, it is just as likely that it will result in the formation of a second and third layer. There is one important thing in ploughing if you plough the hardpan, you have to set the plough so that the pan is just broken. If you plough too deep you will turn this hardpan on top of the soil surface, and then this will cake together and form a hard crust. The same would be true of the trenching method. Therefore you should set your plough so that you cut into the hardpan and merely break it, not so that it is turned to the top. However, in this way only the upper fraction of the hardpan is cut and the rest is left as it was. This is where the subsoiling comes in, it can be done before other cultivation or after ploughing and disking when the land is level. Old pastures can also be revived by breaking up such hardpan layers. Some soilers are more adapted to use on fields before cultivation, but are not suited to pastures and hayfields because they throw too much earth up to the surface. Be sure that you have one with a sharp blade, mounted vertically, so that the soil is cut and not thrown to the surface, otherwise small ridges will result which will have to be leveled out afterward.

Treatment of Wet Soils

One of the most important rules for cultivating a soil and bringing about a favorable structure, and soil life, is never to touch a soil when it is too wet; if a soil sticks to your shoes it is still too wet. Nor does a soil which is too dry respond well to cultivation, since the lower layers might still be wet and if one mixes the two a lumpy structure results. These lumps are quite a handicap for further cultivation and roots crops, mangels, carrots, beets, will not grow well in such lumpy soils. You can walk through a garden bed or field of carrots and if you see there underdeveloped plants, you can be almost certain that the seed germinated on top of a lump. Another rule which is frequently overlooked is that with each cultivation you ought to go deeper; first cultivate the top surface, then the surface soil generally, then a little deeper. Then you might go back to the surface because this, as the result of the weight of the machines or your feet, may be caked on the surface. Then you will have prepared a good seed bed. It is most important for almost all seeds that they are not buried too deep in the ground; 2 inches is about the maximum depth for all seeds. It is usually best just to cover them slightly. To do this you will have to have a fine crumbly structure on the surface. It seems to be best, therefore, to do this subsoiling in the fall, then a good winter drainage will also be brought about. The soil will dry out better and lend itself to a thorough cultivation of the surface.

Treatment of Orchard and Berry Soils

In planting an orchard or berry patch the ground should be subsoiled before setting out the trees or bushes. With young trees it is still possible to subsoil, but with older trees there is the danger that the roots have gone too far and the subsoiler might harm the roots or not go through at all. In

very rocky ground where the subsoiler is not able to cut into the deeper layers, as in Florida for example, a kind of dynamiting can be used. There a dynamite is used which does not blow up holes but just shakes the soil up. I have seen a demonstration of this kind of subsoiling with dynamite in southern France, where the owner of a calcareous hill wanted to plant a garden and an orchard. The soil was rocked by the dynamite and given a shaking and crumbling. Charges were planted at distances of twenty to twenty-five feet and set off all at once. The result was a very crumbly structure of the soil. It was astonishing that the earthworms were not killed but continued to live and multiplied much more rapidly than before. In fact, I observed an extremely active earthworm population in this soil. This is, of course, an exception which is not to be applied everywhere, but only under certain circumstances and supervised by an expert in the field of blasting.

Semi-Arid Soils

Another problem which we have encountered recently, mainly in California, is that in semi-arid areas, where the surface soil dries out very much but is of a light structure. There we have found more mineral elements, nitrates, phosphates, and potassium in the subsoil than in the topsoil. Through the too-crumbly structure of the topsoil these minerals have been washed down into the substrata by rain or irrigation and are temporarily lost to the plant roots. In such cases two steps are necessary, one is to mulch the surface soil to reduce the washing out and the drying out. The second step is to grow a cover crop or green manuring crop of deep rooting legumes, which can reach those deeper layers with their roots and bring those minerals back to the surface. If these cover crops are then composted or ploughed under as green manures, the surface soil will be enriched. In this way we have a biological procedure of "a reversing of the soil," not by ploughing but by growth. The fault, which we see in many cases, is that in the surface soils there is too much cultivation, while no attention is paid to the subsoils.

Testing Physical Structure of the Soil

It is wise for every gardener and farmer to orient himself in regard to the physical structure of his soil. Digging a hole about six or eight inches square and as deep as necessary, that is anywhere from one to two feet, will inform him what he has to do. In this way you can even trace in the various strata of the soils what mistakes have been made in previous years. You can tell as far back as three or four years whether there was a wet or a dry year, whether the soil has been ploughed correctly or not or at the right time or not. When you make the hole, make sharp clean edges, then use a scraping instrument and scrape off the inner wall in order to observe the structure of the soil. In a garden with heavy clay soil which packs down tightly, you can help by building up raised beds, or by planting the seeds on little mounds or hills. In this way the soil gets more aeration and develops more bacteria, and will become looser gradually also. We have observed excellent results on raised beds and hills with strawberries and tomatoes. Cucumbers and peppers also lend themselves to this practice, and spinach and lettuce too.

Surface Irrigation

Surface irrigation, if frequently repeated, and a lot of water is applied so that the water stands for several hours or days before it is absorbed, also packs the soil down and forms crusts and hardpans. Irrigation which is carefully applied just so that the field is moistened and then stopped and repeated later, after surface cultivation, is much better. Subsoil irrigation would be even better. In greenhouses we have applied this by putting drain tiles about a foot or a foot and a half underneath the surface and fill-

ing these with water so that the water gradually seeps out through the porous tile to the soil, and the water is shut off as soon as the surface becomes moist. In this way no hardpans are formed and the crust on the surface will be very slight and can be easily broken up.

Soil Profiles

A chemical analysis will not immediately reveal the influences or hardpans and crusting when the sample is sent to the laboratory since it is usually broken up by the time it gets there although you might find some lumps in it. The digging of a soil profile has to be done on the spot and the farmer or gardener has to make his own observations. Our neglect of this problem of the proper structure of the soil is revealed when we ask ourselves and one another how many soil profiles we have made and how many hardpans have we found. Very few people are able to answer these questions. It is a most fascinating study I can assure you to dig into each field and look at the structure and then work out the means to improve each. The results will be that more minerals will be available and the plants which grow will grow better and be healthier. In particular, fungus diseases will be lessened, plants will not turn yellow on account of malnutrition. Once done, subsoiling does not need to be frequently repeated. If the farmer has learned to care for the physical structure of his soil properly, he might not need to subsoil more often than once in ten years. On heavy clay soils which pack easily it might be necessary once in five years.

Corrections in article on NITROGEN by Dr. E. Pfeiffer in the June issue of the *Organic Gardening Magazine*:

Page 24 column 2, line 3 read Nitrosococcus instead of Nitrococcus.

Page 24 column 2, line 12 read radical instead of radicle.

Page 25 column 2, line 20 read leguminosarum, not leguminsarum.

Page 28 column 2, line 28 read fertile, not sterile.

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Organic Garbage Disposal

By CHAERIN LAMON

"H—!" I heard my next-door neighbor call. "Come here and see what these awful things are that are falling over the side of the garbage can!"

Having been unwillingly interested in her garbage can for some months, I listened intently and soon learned that the "awful things" were maggots. I was not surprised, as our interest had been aroused by exactly the same thing that had attracted the flies whose eggs had produced those maggots. We could not see how anyone could stand such a stench on the premises, much less go near enough to add fresh garbage. (There was a lid for the can but it fit poorly and was often off.) When some prowling cat or dog had dragged an enormous fish head (with attachments!) over onto our front terrace, we had to ask that the lid be weighted down. But we continued to need gas masks periodically.

This is our first experience with living on a small suburban lot. There is a weekly refuse collection, (all right, in a way, in winter) but after three weeks of that we had had an inspiration for prompt garbage disposal that would "kill two birds with one shot."

The challenge in the poor soil here was the inspiration.

That was in our P.O.G. days (Pre-Organic Gardening) and we had planned to use plenty of 5-10-5 or whatever Victory Garden fertilizer our dealer should say was best. But somehow there was still the question: What really makes soil good? And the line of reasoning in answer ran something like this:

Plants grow in forests and even on deserted lots without benefit of commercial fertilizer. And each year, on a lot growing up in weeds, the "crop" is better. What feeds these weeds? Each year the plant material lies where it falls, on lot or in forest, and all animals and birds that die there gradually disappear, as do their droppings. Could we not copy that pattern after a fashion?

We could not just throw all our refuse onto the earth, and the ground was so hard that digging a good hole in it each day (in winter) seemed too difficult. If garbage were only fine stuff that would disintegrate rapidly! —Well, it could be made fine, in a food chopper. And so we began grinding everything that could be ground, buying bones, etc., and throwing out liquids and pan-rinsings, systematically so as to avoid too much in any one place. The solids were packed into jars and kept in the ice box until there was enough to warrant setting up the chopper once or twice a week. The fine particles of orange rind, etc., made a bright showing for a day and then faded out.

With the coming of spring and the growth of plants, and with the help of our straw mulch, we were soon able to hide everything thrown out. Then in the early fall we made our first compost pen and began burying refuse in it. It was small and we found occasionally that we must resort to burying or grinding and scattering again.

But finally we were introduced to the Organic Method and the Sir Albert Howard way of compost making. Until

we were inspired to impregnate the Albert Howard compost pile (*after the heat had gone out*) with domesticated earthworms, we had to have a separate refuse burial heap. But now the one heap does for both a source of compost and an Organic Garbage Disposal Plant, clean, sweet, and not unsightly, covered as it is with a mulch of hay or straw to shade it and help keep the moisture in.

The bucket that we keep in the cupboard under the sink is taken out and emptied at least once a day; (it is easy to keep it clean, most often with the suds drained from the washing machine).

We try to dig the hole in a new place each time, advancing around the heap. By the time we get back around to where we started there is nothing recognizable to dig up. Sometimes, for the sake of curiosity, we dig where we buried only a few days before. Bones and egg shells, we find, are the last to disappear; cabbage stalks, asparagus butts and corn cobs seem almost to be the favorites of the earthworms, judging by the hundreds seen eating on them. However, they must like everything, it all disappears so fast.

It is all too sweet and clean to attract house flies to lay their eggs in it, and we have no fly problem—and no maggots.

For awhile the refuse disposal men came into the yard weekly, but finally the word seemed to get around. One day I overheard the driver call out to an obviously new member of the crew who was entering our yard, "No use goin' there, they ain't got none!" I wonder what conjectures they make as to what we do with ours.

When we moved here there was very little growing on the place; the chief reason was obviously poor soil. Even before we began using domesticated earthworms to help feed our garden, our mulching and use of all our refuse had noticeably improved the color of the earth. (We have samples taken each summer to show the changes.) Everything grows almost too well, if such be possible. Raspberry suckers, for instance, are more trouble to keep pulled out than weeds. (But they make a nice little gift to pass over to another gardener.)

And so we find that *all* we bring home from the grocery store is used; we have no waste. We have come a long way from our "raising": our potato skins we eat today; our egg shells we'll eat next year or the next, and they'll taste like Swiss chard or raspberries.

ORGANIC GARDEN CLUBS

The Organic Garden Club of the Eastbay is made up of members from Oakland, Berkeley, Piedmont, San Leandro, Lafayette, Orinda, Walnut Creek and other small California towns adjacent to Oakland. The Club is receiving favorable publicity. The Oakland Library is acquiring *Farmers of Forty Centuries* and other books from the Rodale Press.

The last meeting of the Organic Garden Club of the Eastbay was held July 23. The speaker at the May meeting was Mr. Fred Barbour of Oakland. Mr. J. Smith Knapp of Berkeley and San Lorenzo, nurseryman, was the speaker at the June meeting.

Anyone interested in joining this Club should get in touch with Mrs. K. F. Dittman, 215 Highland Ave., Piedmont 11, Calif. Telephone Hu 3-3847, Secretary. The chairman of the Club is Mr. Jack Robinson, 18 Cambridge Way, Piedmont, Calif.

BOTANY for the GARDENER (10)

By DR. WILLIAM H. EYSTER

The Plants in the Soil

SLIME MOLDS

THE slime molds constitute a remarkable group of soil organisms in that they have characteristics of both plants and animals. The vegetative body of a slime mold consists of a naked mass of protoplasm containing many nuclei and is called a *plasmodium*. Slime molds can be recognized by any observing person who looks for them in a damp, shaded woodland, especially in the spring and fall months when the frequent rains keep the floor of the woodland sufficiently moist. They have the appearance of a creeping, slimy, shapeless mass. The plasmodium of a slime mold puts forth finger-like projections in the direction of its movement and then the main body of the slime mold flows into these projections. They lack chlorophyll but often contain some other pigments which give them their usually bright colors. Because of their delicate structure and brilliant coloring, many of the slime molds are of remarkable beauty. *Aethalium septicum*, for example, which lives on spent tan bark has a bright yellow plasmodium. Most slime molds live on dead stems, branches, and leaves of trees and play an important part in converting them into humus.

Slime molds are quite sensitive to environmental conditions. They avoid bright light and thus usually occur on the under side of the plant material upon which they feed. Water and nutrient materials are taken into the plasmodium by osmosis and in accordance with the laws of diffusion in the same way as they are taken into the roots of the higher plants. Since slime molds lack chlorophyll, they must live either on the dead organic matter in the soil as saprophytes or on living organisms as parasites. Fortunately most of them live on plant residues and thus may be regarded as important soil organisms in the conversion of plant residues into humus and plant nutrients. As the plasmodium flows over plant residues, it may ingest small particles and digest them in the same way as it happens in the body of an amoeba, a microscopically small, one-celled animal. The absorption, digestion, and assimilation of foods enable the plasmodium to increase in size by growth, including an increase in the number of the nuclei by repeated division. If food and moisture are abundant, growth and nuclear division may continue for weeks and even months. A single plasmodium may become several inches in diameter and a half inch in thickness and contain thousands of nuclei.

When the food supply, moisture, or other environmental condition necessary for growth become less favorable, the plasmodium becomes thicker, rounded, and less transparent, and often assumes some bright color. It now also becomes attracted to the

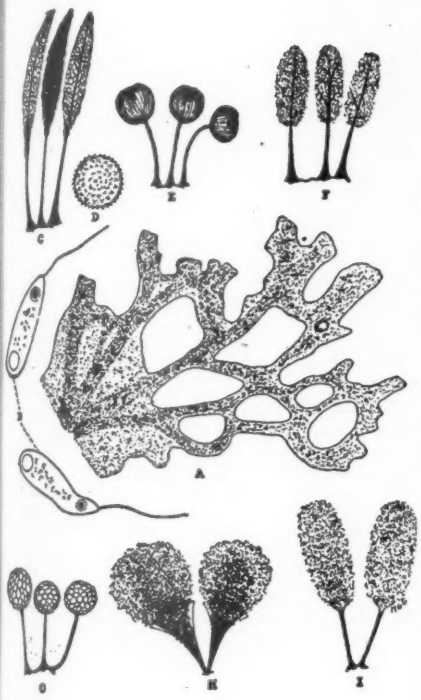

Fig. 24

Slime Molds.

A. Piece of a plant body, called a plasmodium.
B. Swarm spores with a single hair-like motile organ.
C. Spore cases of a common slime mold, Stemonitis fusca.
D. A spore of Stemonitis fusca.
E. Spore cases of Dictydium umbilicatum.
F. Spore cases of Comatricha longa.
G. Spore cases of Cribraria minutissima.
H. Spore cases of Hemitrichia clavata.
I. Spore cases of Arcyria punicea.

light so that plasmodia which are in the interior of a decaying log or stem or on the under side of pieces of bark or other plant material flow out to a drier and more exposed surface. During this movement, portions of the plasmodium may become separated from the main body. In such exposed and dry places the plasmodium becomes transformed into a cake-like body composed of rounded masses of protoplasm which are surrounded by a more or less definite membrane. A plasmodium covered with a protective membrane is called a *sclerotium*. Sclerotia have a wax-like texture and may remain dormant for several months without losing their vitality. When favorable conditions return, the sclerotia absorb water and resume their normal life as plasmodia.

After a period of active growth, slime molds move into the light and develop one or more spore cases filled with spores. The spore cases of some common slime molds are shown in Fig. 24, C, E, F, G, H, and I. When the spore case is mature, its wall bursts and the spores are discharged and are distributed by the wind. A single spore of a slime mold (*Stemonitis fusca*) is shown in Fig. 24 D. Under suitable environmental conditions the spores germinate to form small amoeboid cells. These cells fuse in pairs to form fusion cells which then develop into a plasmodium again.

One group of slime molds (Acrasiaceae) differs from others in that the small independent amoeboid cells developing from the spores increase in number by repeated divisions but do not fuse to form a plasmodium. The individual cells feed on bacteria, and evidently play an important role in maintaining Nature's balance of soil organisms. Some slime molds live as parasites in the roots of higher plants, as *Plasmodiophora* which causes the *clubroot* of cabbage. In this case an amoeboid cell enters a root of a young cabbage plant and forms a plasmodium inside the root. The plasmodia live inside not between the root cells. They reproduce and eventually penetrate into the cortical region of the root. The invaded cells become greatly enlarged in size so that the root assumes a large club like form while the head of the cabbage grows very little or not at all.

Slime molds are of especial interest to organic gardeners in that they are capable of reducing the lignin of woody cells into compost. Compost heaps which include the branches and leaves of trees and are sufficiently moist and protected from light may well be inhabited by slime molds.

Plate A

Photo by H. C. White

OUR
ORCHARD "QUEEN"

Betty Landis surrounded by a halo of apple blossoms on one of our Biological Research Farms. No poison sprays or chemical fertilizers are used on this 10-acre experimental farm. Will we have any marketable fruit? That is the $64.00 question. The neighbors all say NO! But Betty and some of the rest of us, are hopeful. We are giving the orchard a good Organic treatment as rapidly as possible.

CRAZY MAN'S ORCHARD

By HERBERT CLARENCE WHITE

AND this time it's ME! Last year *Country Gentleman* ran an article entitled, "Lazy Man's Orchard". It was the story of Rory Collins of the Hood River Country in Oregon and his fifteen acres of pears.

We won't go into details here, but for those of you who did not read the story, Rory got tired of doing all the things that the "experts" told him to do in order to get a crop. Facts are, he just couldn't *afford* to keep on making silly but "orthodox" motions on his fruit farm. So, according to the story, he quit cultivating, as well as a lot of other things too numerous to mention that other orchardists do; and, believe it or not, his crop doubled while his expenses hit an all-time low. Today-according to reports, Rory Collins is a well-to-do man, thanks to what he calls, "scientific neglect!"

And now *I've* gone and done it!—Bought me a ten-acre apple and walnut orchard up here in Paradise in which to play around. And do they have "bugs" up here on the "Ridge"! My neighbors are apple and walnut growers too. They disc and they harrow, and they spray—spray from twelve to fourteen times a year in the "best" orchards in order to keep the bugs in even partial check.

It appears that we have developed a race of "super-bugs" out here in California, and now the old-time

stand-bys—the lead and arsenicals are being replaced by that neat "life exterminator" DDT! Just as in England, where they are now using sprays containing 200 times the amount of poison prescribed by the Law, we here in scientific America have found that it is necessary to create more and more powerful poisons to keep the coddling moth and his allies where they belong.

But here is the "joker" in this "slaughter method" of insect control. The DDT also murders our benefactors—the enemies of the red spider and the woolly aphid, not to even mention what it does to our friend the earthworm and other forms of beneficial life in the soil.

According to a recent Bulletin published by the Division of Entomology, University of California, "Woolly apple aphid infestations have increased after DDT applications, and in some orchards have been a real problem." And that's a masterpiece of "understatement"; for one prominent farm advisor told me a few weeks ago that in his county where DDT has been used extensively, the red mites and woolly aphids had "taken over" and in plain language "they (the orchardists —not the aphids) were sunk"!

How long are we going to keep our heads (ostrich fashion) stuck in the sand? How long are we going to ride this "merry-go-round" of slaughter? How long will it take us and our university-trained "experts" to learn that in upsetting nature's wheel of LIFE, we are blindly, willfully "creating our own problems for the doubtful pleasure of solving them"? Is there any hope for us? Will we ever learn? Or are we, like the ancient dwellers of

Plate B — Photo by H. C. White

THE "TREATMENT" BEGINS

A half ton of leaf mould, river bottom silt, and ground phosphate rock placed around the drip-line of the branches, is the first step in our treatment to build up the health of the tree. Immunity from all disease and from most insect pests without the use of "lethal weapons" is our goal. The mixture of organic fertilizers is placed in a shallow trench around the tree as indicated above. Then 1,000 of the famous Domesticated "Soilution" Earthworms are placed in this trench.

Babylon, "weighed in the balance, and found wanting?"

Right here and now I'm tempted to tell you the story of my pal and boyhood chum, Dr. Roy Falconer, of Lakeport. In the good old days of the "teens" of this present century, Roy and I played sand-lot baseball together; together we fell in love with the same pretty girl. (Neither one of us married her, so we're still good friends!) Both of us served a term as missionaries in old China. Six years ago both of us found ourselves in the suburbs of Los Angeles,—and today both of us are orchardists, as well as a lot of other things. So Roy and I have a lot in common.

Three years ago it was my happy privilege to make my first *"convert"* from among the ranks of the medical profession to this new "way of life"—this thing we call Organiculture. Yes, you have guessed it. Roy was that man!

Dr. and Mrs. Falconer had just recently purchased a beautiful home on a knoll overlooking Clear Lake, in northern California. Back of the house and flower gardens stood an old worn-out family orchard and fruit farm—six acres of English walnuts, apples, pears, peaches, prunes, and grapes; plus a large Boysenberry patch.

"Shot-hole" fungus, virus diseases, coddling moth, red spider, and woolly aphids had left their tell-tale marks on this old fruit farm. In fact many of the trees were in a dying condition. Some had not borne any fruit for years. "Might as well cut them down and start over", was the cruel but frank verdict of the Lake County

Plate C

Photo by H. C. White

THE TREE IS LEAF MULCHED

The entire area from the trunk out to the drip-line of the branches is then covered with a 3-inch leaf mulch. This leaf mulch holds the precious moisture, keeps down weed growth, and feeds the tree as well as the earthworm population. Remember, leaves are richer in essential minerals in colloidal form than barnyard manure, and they don't "burn" the leaves off your tree. Through these simple methods we hope to make "Crazy Man's Orchard" an object lesson to both the friends and critics of Organic Gardening methods.

Farm Advisor; "There's only one chance in a hundred that you can save them—and then only if you follow a rigorous program of spraying."

So Roy was "on the spot" as we say. Common sense and a good Scotch ancestry told him to "go slow" on the poisons. On the other hand, the "experts" with all the "science" and lethal weapons produced by the Division of Entomology of a great University urged him into a program of *"slaughter"*.

Then, at the supreme psychological moment, when Roy needed help the most, I came along with my library of Organic Gardening literature, including Sir Albert Howard's *Agricultural Testament,* Rodale's *Pay Dirt,* Cocconnuer's *Trampling Out the Vintage,* etc., together with an armload of *Organic Gardening Magazines.* Roy and I immediately went into conference. When we came out, Roy was a "convert."

So, instead of buying a spray outfit with its arsenal of lethal weapons, Roy and I took the trailer, hitched it to the back of his shining "Oldsmobile" and off we went in search of leaves—leaves for compost, leaves for mulching, etc. The adjoining chicken ranch was blessed with a fine grove of black oaks. Roy soon persuaded the owner that those leaves would "look better" across the fence! With rake and shovel and fork we soon had mountains of leaves and leaf-mold ready for the compost heap and the fruit orchard. What a precious heritage we have in those mineral-rich treasures from the forest! "Black Gold" we call it.

We were sitting on the front porch one evening looking over the rippling waters of the lake at sunset, with its fiery path cutting the blue-green of the water. All along the lakeshore a heavy growth of "tullies", a hardy water-plant, which in some sections of California is regarded almost as a "pest" was clearly visible. Then it was that Dr. Roy got a brilliant idea. Why not harvest the tullies and use them as a mulch around the trees and vines, and in the vegetable garden?

No sooner said than done; and the next thing we knew our good doctor friend was down on the lake gathering "tullies"! He even went so far as to hire a hay-bailer, and in a few days he had nearly 500 bales of precious organic matter ready for the compost heaps and orchard mulching.

That was nearly three years ago—and to make a long story short—thanks to mulching and other simple Organic Gardening procedures Roy's sick trees did *not* die. In spite of so-called "neglect" and the dire predictions of the "experts", a near miracle has taken place in that orchard.

In fact, those dying trees that were a mass of "shot-hole" fungus, and riddled with virus and all the other diseases to which the modern orchard is heir, have had a "re-birth" of life and vitality. Trees that had not borne for years are now producing heavy crops of flavorful apples, peaches, pears, prunes, etc. People won't believe it, but Roy and I have seen it "happen" right under our very noses. And still the "skeptics" will say, "Where is your proof?"

Yes friends, with the restoration of LIFE within the soil of that orchard there has come a commensurate restoration of LIFE in tree and vine. Again we stand reverently before this manifestation of the power of God in nature—where the simple laws governing natural soil fertility are acknowledged and obeyed.

"And what about the 'bugs'—those terrible and terrifying insect pests?" I asked Roy at the Annual Scientific Meeting of the American Academy of Applied Nutrition held recently at the famous Fairmont Hotel in San Francisco.

In brief, here is his answer: "Without any stimulants and without poison sprays of any kind, we are getting wonderful crops of superior quality, flavor and keeping power. Last year our apples were 75% worm-free, and our pears were 85% perfect fruit of marketable quality. Even my English

walnuts no longer have that bitter tang, so common to walnuts." And that, for sick trees, with only a little more than two years of Organic treatment is saying a lot in anybody's language.

Dr. Falconer attributes this remarkable record to heavy applications of "tullie" and leaf mulches *alone*. No so-called "fertilizers" were used—no, not even compost! So, I said: "Roy, old pal, if *you* can do it, so can *I*!" And I ups and buys ten acres of apples and walnuts!

Of course, in addition to Dr. Roy's remarkable experience, I had the testimony of my own Gardena experiments in biological soil building, with four successive years of worm-free apples, pears, peaches, and grapes.

But I am told that it is *one thing* to produce worm-free fruit in a backyard garden, and an entirely *different* problem to produce disease-resistant, worm-free, marketable fruit from a commercial orchard—without resorting to an armory of poison sprays!

Right here is where I need the prayers of all the Organic Gardeners everywhere! If that poor old "darkey" thought *he* was "standing in the need of prayer"—that goes *double* for H. C. W. right now!

All the old-timers up here on the ridge look at me in a queer sort of way, as much as to say, "the poor old duck, he sure has stuck his neck out this time." The former caretaker of my new possession voiced the sentiments of one and all when he said: "Mr. White, if you *don't spray*, you won't get any fruit. You are throwing $1,500.00 out the window!" (Maybe I should stop right here and "pass the hat".)

Old Mr. Spencer's solicitation on my behalf reached an all-time high the other day when I was away lecturing at the Biltmore Theatre in Los Angeles. At the very time that I was pointing out to my big Los Angeles audience the "dangers" to life and health in the prevalent use of poisons in the orchard and garden, Spencer sent over a man who does "custom spraying", with his apparatus, and with orders to "spray that orchard, come hell or high water!" It took more than ordinary persuasion on the part of my new assistant who lives on the place, to countermand that order from the former "caretaker." Of course, the old man thinks I've gone "nuts" and his intensions are of the very best.

But to come right down to "brass tacks", I *do* face a crisis in this brand new orchard of mine. The apple and walnut trees are ten years old. They are just coming into production. Will I, or won't I get a marketable crop this year? According to my knowledge on the subject, it is too late to apply any program of soil enrichment that will benefit *this season's* crop. As I write these lines the trees are in full and glorious bloom. Whatever I do *now* to build up the health of my trees will show up in next year's crop at the very earliest. So, in the words of the Japanese house-boy, "What to do?—is problem."

In my distress, I appealed to one of my friends, who is a producer of the famous Domesticated "Soilution" Earthworm. "Save my neck, and give me WORMS!" I cried. "Be a pal, and at the same time become a benefactor to poor 'starving' humanity!" I pleaded. "If we can prove that worms 'downstairs' will help produce worm-free apples 'upstairs', it will eventually revolutionize the industry," I urged, "and the demand for your 'pedigreed' Domesticated worms will hit the ceiling."

I asked for 200,000 worms! (I'm getting more modest every day.) My good friend wrote back that he "couldn't become a benefactor to poor humanity" if he tried, but that he would let me have a culture bed containing, according to his estimate, up to 180,000 of these little earthworkers for the experiment. Did I shout for joy! and did I sing!

Needless to say, within a few days I was in Southern California again—trailer in tow—ready to pick up that precious cargo of worms. Today tens

of thousands of them are working under my trees and vines, and they already appear to be fat and flourishing.

Many in my agricultural classes ask: "Mr. White, how do you get the Domesticated earthworms started in the garden and orchard?" Some day I am going to answer that question in detail. We are trying out some very interesting experiments right now on our Biological Research Farms that I am sure will prove very helpful to our readers. But that story will have to wait for the next issue of my favorite magazine.

In the meantime, and in the days to come, when you think of organically-grown fruit—especially apples and walnuts, don't forget H. C. White's Biological Research Farm in Paradise, otherwise known as "Crazy Man's Orchard", and when you pray, don't fail to remember—"It's me, it's *me*, it's ME! . . . Standing in the need of prayer!"

Loafing Sheds

Not long ago one of our readers described his practice of using hogs in working up his plant residues and converting them into compost. His equipment consisted of a covered shed which served as a large compost enclosure. All kinds of plant materials were laid down for the first layer. This was worked over by the hogs and reduced to small size and mixed with the manure from the hogs. In due time, the plant and animal residues were leveled off and given a thin coating of soil plus a sprinkling of raw ground limestone. Then another layer of plant material was added and the hogs proceeded to reduce the plant residues and mix them with their dung and urine. In this manner all dung and urine are utilized and are returned to the land with the finished compost.

In the winter 1947-1948 issue of *The Land,* Louis Bromfield gives a short account of his loafing sheds in which the cattle are fed and allowed to eat what they please and to move around from one part of the shed to another. This permits each animal to balance her diet between silage and hay. One of the most profitable aspects of the loafing shed is that it represents a method of making valuable organic fertilizer from the manure. By leaving the manure in the shed for six weeks or more, the straw and sawdust which is added daily is well on its way to being composted by the time it is worked into the surface layers of the soil.

A rich crop McFarland

STRAWBERRIES IN ROCKS

By GURNEE WILLIAMS (Mrs. Wm.)

THE first sentence of Mr. Rodale's article, "Stone-Mulches," in the May issue of *Organic Gardening*, made me stop, think and start counting. Mr. Rodale had written, "There must be at least a dozen advantages inherent in the use of rocks as a mulch for growing plants and trees." The advantages I counted were of necessity practical ones, since I lacked his scientific knowledge and approach, but, even so, their number seemed great enough to prompt the telling of our experience with rock-mulching in our strawberry patch.

In our opinion, there can be no disagreement with the old, old quotation about strawberries: "that God could have made, but God never did make a better berry." Consequently, there had been many a huddle over where they might be raised. We agreed there simply wasn't any room for berries, all of our ground was in use—all, that is, which could be used. There was that steep hillside, but my engineer-husband, the family soil conservationist, was certain any cultivation would cause it to wash disastrously. Yes, there was only the steep hillside, and with rocks, why not? For a long time we had been enthusiastic concerning the efficacy of rock-mulching our fruit trees, so this problem of how to anchor our dug-up hillside was a blessing in disguise because its solution taught us the value of rock-mulching between strawberry rows and of a "permanent patch."

The ground was spaded, leveled slightly and rows of stone 24" wide laid across the side of the hill. Soil space of 21" was left between the rows of stone. How neat it looked, and what an improvement with the weeds and debris turned under and roots and scrub growth dug out! Indeed, it was, and has remained, one of the most interesting and attractive spots on our something-less-than-an-acre. Because of the good which came from the leaf and stone-mulch around our trees and because we had some oak leaves, we decided a carpet of leaves beneath the stones might be of value. This spring, upon removing some stones and turning over a spadeful of soil, seven earthworms wriggled their displeasure, and I wondered if those leaves might not have been good earthworm bait. There are more holes beneath those stones than in any salesmanager's map, and how beneficial they must be during summer downpours.

Following the spading and laying of the rock-mulch, compost, leafmold and bone meal were dug into the heavy yellow clay of the soil rows. To know that that improved soil and subsequent enrichments would be held within the confines of the stones, for

use by strawberries only, has been a source of considerable satisfaction. It is our opinion, if strawberries are to remain year after year in the same location, they should be kept well fed, and from time to time we add dressings of compost. With a built patch, such as ours, to relocate it every couple of years or so, if space were available, would be lots of work. By keeping the plants well nourished, properly spaced and seeing to it that every plant which has produced two crops is replaced with a runner plant, we have a "permanent patch" with vigorous, heavy bearing plants.

The plants are staggered in the 21" soil space, and we try to keep them about a foot apart. Each year, as soon as the bearing season is over, half of the plants are pulled up—they are the ones cropped twice. Since we have tried to have about every other plant a two year old, it is almost always possible to use a runner plant from an adjoining one year old to replace the plant pulled up. Before the runner plants are located (held in place with clods of dirt), compost is spread around the remaining year-old plants and dug in where we are going to place the new plants. When it is not possible to locate a runner plant where we wish one to grow, 3" or 4" clay pots, filled with a rich mixture of compost and soil, are sunk to their rims beneath the runner plants. As soon as the plants are well rooted, about August, they are taken from the pots and moved to where we want them. These plants bear well the first year, even better the second. All other runners are kept snipped off, and what we have is hill plants measuring from a foot to more than a foot and a half across. How does one distinguish between one year old and two year old plants so as to replace only two year olds with young runner plants? Experience, size and location of the plants help, but if in doubt, do as we have done, push sticks or plant markers into the soil beside either the older or the younger plants. We are sold on a permanent patch; to have strawberries *here* one year and *there* a couple of years later seems like a lot of unnecessary work to us.

Because our summers are hot and dry, and we have frequent thawing and freezing in the winter, the soil surrounding the plants is mulched with spent bean and pea vines and bushes, dead fibrous herb and flower plant growth, etc. However, where moisture retention and soil temperature are concerned, it is our guess the rock-mulch is of considerable advantage to the soil rows between them. During the heat and drought of midsummer, we have noticed the soil beneath the stones appears less dry and feels cooler to the touch.

We can cite still other advantages in the use of rocks in our strawberry patch. They keep down weeds, they are nice to have underfoot when it is muddy and 36", 1" mesh chicken wire bowed up and tucked in along their sides keeps ripe berries off the birds' menu. Mr. Rodale, or any other rock-mulching expert, could, we are sure, add several more advantages to the practical, homely ones which are apparent to us. Yes, while rock-mulching made our raising strawberries possible, we are convinced the "advantages inherent in the use of rocks as a mulch" have made them better.

Organic Gardeners' Digest . By Dr. William H. Eyster

HUMUS AND FLAVOR IN APPLES

"Restoration of Humus Essential" was the keynote of a meeting of fruit growers held at the United Fruit Company's offices in Kentville, Nova Scotia recently. Dr. G. R. Smith, director of chemical services in Nova Scotia stated that, "Lack of humus is one of the critical points in attempting to overcome present orchard problems." He insisted that a build-up of organic matter is essential if nutritive elements in the soil are to be made available to trees. He further argued that nitrogen can be supplied from the air in greater quantities, providing the soil conditions are improved. However, he pointed out that this can only be achieved by raising the organic content to a point where a high level of bacteria is active in the soil. Dr. R. J. Leslie, general manager of United discussed the importance of flavor and keeping qualities. According to him, "It is common knowledge that varieties which once were kept in good condition through the winter are now considered to be fall apples. Some effort must be made to recreate the conditions which prevailed in the past." Mr. Leslie believes that diseases and insect damages are the result of deficiencies in the soil.

Mr. Cameron Spurr, field representative of the Valley's cooperative, reported that the early drop of McIntosh had been corrected by building up the organic content of the soil. According to him, "The addition of humus had built up the soil so that during the driest period of the summer, moisture could be squeezed from a handful of earth picked up at random in the orchard. Under these conditions the McIntosh were held on the trees until they had reached proper maturity. The keeping quality of the fruit was greatly improved.

—*The Post Road,* May 4, 1948.

FLAVOR IN FOODS

As vitamins have inviting flavors and aromas of their own, persons demanding savory foods were on the right nutritional track since research has shown that there is a definite correlation between foods with an appealing taste and those high in nourishment. A child lacking sufficient calcium and vitamin D was found to select foods providing these substances. Vitamin C possesses a pleasant, slightly acid flavor which probably is carried over into the aroma of food. It also has the ability to stabilize foods and prevent off-flavor.

—*Chemical and Engineering News,* May, 1948.

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SUBSURFACE TILLAGE AND NITROGEN

The development of nitrates in soil with sweetclover residues on the surface and cultivated by subsurface tillage was compared with the production of nitrates under the common methods of farming where the sweetclover residues were plowed under on field plots at Lincoln, Nebraska. The average amount of available nitrogen for a five-year period in corn grown in the soil after it has been in sweetclover for two years was 10 per cent lower in subtilled plots than in plowed plots. Nitrate determinations in three different years in corn land made about the first of November, after the corn was mature, showed that a larger amount of available nitrogen was present in the subtilled soil than in the plowed soil. Some of the nitrogen seems to have been carried over into the next season. This was shown by the fact that the increase in nitrate in the plowed soil over that which was subtilled was less in the second year corn than in the corn grown the first

year after the sweetclover. In the seedbed for winter wheat in three different years the average available nitrogen was slightly lower in the subtilled than in the plowed soil. The amounts of available nitrogen produced were large in every test and potentially sufficient to produce large yields of corn or other crops.

The slower nitrification process as it occurred in the subtilled soil must be regarded as a desirable circumstance in a region of limited rainfall. Also the high nitrate levels that were obtained by growing sweetclover and subsurface tillage are desirable also in areas of depleted soils where the clover residue serves as a protection against soil erosion.

—*Journal American Society of Agronomy*, May, 1948.

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WHAT PLANTS NEED

Like animals, plants need balanced rations. If a plant has too much nitrogen and not enough phosphate, it will be leafy and produce only a little seed. What seed it does produce, will be light and chaffy. If the crop is small grain and there is too much nitrogen in proportion to the phosphate and potash, the plants will lodge. Potatoes and other root crops will go to tops and produce small root systems if there is too much nitrogen and too little plant foods*.

Nature is generous in supplying soils rather generously with potash but not so generous with phosphate. Nature didn't put anywhere near enough nitrogen in the soil to last forever. But she did something else. She provided tools by which you can replace the nitrogen your crops use. These tools are the legumes, such as alfalfa, the clovers, soybeans, and others.

—*Pay Partners of the Soil*, 1937.

(Editor's Note: *Potatoes are not root crops, as the tubers are enlarged, modified stems.)

BALANCE IN PLANT NUTRITION

The idea of balance in plant nutrition is tremendously important. The constituents of the soil which see to it that plants do get their rations in the right proportions are the colloidal particles of clay and humus. The negatively charged clay and humus hold such positive ions as calcium, magnesium, potassium, boron, copper, and other essential elements with bonds that can be broken and deal them out to the roots of our crop plants in exactly the right amounts. If, however, highly soluble artificial chemical fertilizers are put into the soils the nitrogen, potassium, and phosphorus ions are present in such predominating numbers that they crowd many of the other essential elements off the clay and humus so that they then are no longer available to the growing crop plants. To the extent this happens, the crop plants will be absorbing far too many nitrogen, phosphorus, and potash ions and too few or even none of the other essential elements. The absence in the plant of such essential elements is expressed as a deficiency or a degenerative disease, increased susceptibility to diseases and insect pests, and unbalance between vegetative growth and seed production. For well-balanced nutrition, the soil must be sufficiently rich in organic matter to provide humus and colloidal clay to serve as the rationing agents of the elements necessary for the growth of healthy plants—plants reasonably free from diseases and insect pests and which when used as foods will furnish the animal body all the elements and vitamins necessary for sound health and virility.

Dr. William H. Eyster.

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EARTHWORMS AND SOIL AGGREGATION

The small amount of information about the activity of earthworms on organic matter decomposition and soil aggregation led A. K. Dutt, grad-

uate student in the Department of Soils, Cornell University, to make a study of earthworms and soil aggregation. The data presented show quite clearly that in every site earthworm casts have a higher aggregate stability than 0 to 3-inch depth of the surface soils. The stability of earthworm casts for the cultivated site was found to be three times as great as that of its surface soil. Alfalfa hay added to soil, with or without earthworms, produced the highest aggregate stability, but the treatment with earthworms was the highest.

—*Journal American Society of Agronomy,* May, 1948.

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NEW HAMPSHIRE URGED TO TRY OUT ORGANIC FARMING

The Commissioner of Agriculture and members of the legislature's newly created state Agricultural Advisory Board listened for two hours to university trained scientist and farmer, Justin Brande and minority leader Lawrence M. Pickett explain the virtues of organic farming. It is the only program in sight that offers relief from the erosion and depletion of soils; deficient, diseased, and insect infested crop plants; and degenerative diseases of animals and man. Mr. Brande told the committee that the present methods of farming are wrong from the ground up, and that highly artificial and culturally bad farm practices which are working against instead of with Nature are responsible for the unsolved farm problems. Mr. Pickett urged that the State try out the organic method of farming on the experimental farms and the organically grown foods on the inmates of institutions for scientific data on organically grown foods. As more and more understanding of the importance of soil to health and human welfare is gained, less and less attention will need to be given to pesticides, medicines, asylums, and other public institutions.

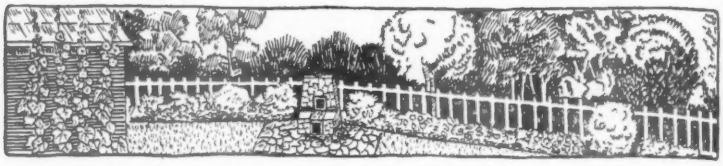
—The New Hampshire *Morning Union,* June 8, 1948.

LAND VALUES

The value of land depends upon its location and the uses that are to be made of it. For agricultural purposes, some land is cheaper at $200.00 per acre than other land that may have the same general appearance at $2.00 per acre. In choosing land, one should take into consideration the way in which it has been farmed over the past years, the average amount of corn or wheat it produced during the past 10 years, the ability of the soil to absorb and hold water, the nature of the parent rock underlying the soil, and the kinds of minerals and the amount of organic matter that make up the soil. All that we are comes from what we eat, drink, and breathe. This means that the soil in which our foods are grown is of great importance in determining our health, intelligence, and our character.

Why, we may ask, do the best trotting horses come from Kentucky? Why have the brainiest people of this country come from certain valleys of New England, New York, Pennsylvania, and Virginia? Why did the buffaloes voluntarily restrict themselves to western Kansas when there were no physical barriers to keep them from grazing on the lush growth of grasses in the eastern part of the state? The answer to each of these questions is the soil which contains such vitally important elements as calcium, phosphorus, potassium, iron, iodine, magnesium, and other elements essential to the production of proteins in plants and animals.

Just as land values vary, so also do the foods grown on the different kinds of soils. Unfortunately the differences in food values are not so apparent. Beans grown in a minerally rich soil may be far cheaper at $10.00 a bushel than beans that look no differently grown in a minerally poor soil at $1.00 a bushel. The time is coming when vegetables and fruits will be sold under the Pure Food and Drug Act according to their mineral content.



Garden Calendar—August

THE NORTH AND EAST

August is one of the most important garden months in the year. It marks the transition from summer to autumn, and is the time for harvesting the spring-planted crops and for planting seeds of vegetables for the autumn table and winter storage. It is time also for sowing seeds of hardy annual and biennial flowers for early growth and blooms next spring.

Collect and save seeds from all flowers and vegetables which ripen in August and the following months. These should be cured in a protected, airy place, threshed, and placed in properly labeled containers.

The Flower Garden. Transplant perennials which have completed their growth for the year and are through the blooming period: irises, lilies (madonna, candidum, umbellatum, turk's), daffodils, colchicums, oriental poppies, fritillaria, Virginia bluebells, primroses, and doronicums. It is well to put a handful of equal parts of compost and sand under each bulb in the case of bulbiferous plants.

As soon as perennials are through blooming and the desired seeds have been collected, place the tops in the compost heap to prevent self seeding. Cut back straggly petunias so that they make new growth and bloom again before winter. Also cut back sweet alyssum, nigella, and California poppies to prolong the flowering period. Keep other annuals and perennials blooming by cutting them freely for indoor decorations.

Make cuttings of the current year's growth just as soon as the stems begin to harden, including carnations, wall flower, geraniums, fuchias, and other plants that you want for your winter window garden. Daphne cuttings may be rooted in a mixture of sand and peat, as they are acid-loving plants. English ivy cuttings made in August will make good plants before winter.

Chrysanthemums which have been kept under black cloth to reduce the number of daylight hours may be exposed to the natural day after August 15. Stake cosmos and other tall plants in danger of lodging. Thin out the rock garden plants. Cut and cure strawflowers and other everlastings for winter bouquets. Strip the leaves from the stem, tie in loose bunches, and hang them heads down in a cool airy place to dry.

Shrubs and Trees. Some August-blooming shrubs are buddleia, abelia,

Spanish broom, lavender, the heathers, and crepe myrtle. Roses should be watered if necessary and given a good top dressing of compost. Hedges of privet and barberry should be pruned again in August. They can be kept most beautiful by frequent pruning.

The Lawn. Prepare the soil in August. For established lawns, watch crabgrass to prevent it from going to seed. Since it can pass the winter only in the seed stage, it can be controlled most easily by preventing seed formation.

THE WEST

August is not too early to begin to think of seeds, seed pods, and all kinds of fruits that can be fashioned into decorative Christmas decorations. Some that may be used for this purpose are eucalyptus pods in a great variety of shapes and sizes, catalpa pods, peony capsules, the spiny heads of teasel which may be brilliantly stained, the thin spoon-shaped pods of jacaranda, and the ornamental gourds. Also watch for seedlings that may be transplanted and grown for Christmas plants. They should be ready for potting in October.

The Flower Garden. Plant bulbs of calla, freezia, madonna lily, ornithogalum, oxalis, bulbous irises, and colchicum. Make cuttings of coleus, geranium, lavender, and heliotrope for your winter garden. Highly recommended for winter color are calendula, nemesia, Drummond's phlox. Transplant bleeding heart and oriental poppy. Make plant selections for next year of gerbera and delphinium while they are in bloom. Keep chrysanthemums pinched back to get bushy plants and plenty of flower heads. Feed them until the buds are fully formed but not after then. Moisture is one of the big problems in west coast gardens. Keep the soil mulched.

Sow seeds of perennials. Pot for spring forcing bulbs of narcissus, hyacinth, tulip, freesia, daffodil, and calla lily.

Shrubs and Trees. Roses should be watered and well mulched with compost. Old canes of polyanthus and climbing roses should be cut out at this time. Shrubs may be transplanted. Make cuttings of woody plants.

Lawn. Do not cut the grass too closely during hot dry weather. Fertilize and mulch the grass with finely screened compost. Prepare the soil for new lawns and fill up uneven places in the lawn.

THE SOUTH

August is a hot month in the South but there always are garden chores to be done.

The Flower Garden. Bearded iris and matured bulbs may be taken up and dried off in a shaded airy place. The irises can be replanted at any time. This is the time also to plant all kinds of narcissus, madonna lilies, and such fall-blooming bulbous plants as lycoris, sternbergia, and hydranthus. August is the best time to transplant camellias. Transplant pansies and violas now for autumn blooms. Sweet peas for Christmas should be planted this month. Dahlias may be given a feeding, and for large heads, pinch off the secondary buds.

What A Lifetime Has Taught Me

By E. H. SAMS

Reprinted From *MOTHER EARTH* (England)

AN old Worthing fruit and vegetable grower, I served my apprenticeship under men who made fortunes from three or four acres of crops, grown under glass and in the open. I well remember their methods of maintaining fertility in their soil.

Artificial fertilizers and chemical sprays were unknown to them. The manures they used were predominantly organic, such as FYM, bone flour and meal, wood ashes, seaweed (which was composted), mortar rubble for lime, and bought-in turf. The only pest that troubled them was red spider, which they washed off plants with rain-water from tanks. Earth-closet manure was used in compost-heaps with soil. Nothing was wasted, and every bit of ground was made to pay its way: chickens were maintained for keeping down grubs, etc. All produce was sent to Covent Garden, and Worthing became famous for honest quality, in fact my father had the honor of supplying Royalty and was the first man to export grapes to America.

The generation that followed these pioneers of Worthing fruit-growing had been taught chemistry at school. They considered that they could teach their fathers how to grow crops with chemicals which acted more quickly and with less labor, and that the diseases and pests which followed could easily be dealt with by the use of more chemicals as insecticides and sprays. Diseases unknown to their fathers appeared, attacking plant and root, even agricultural scientists were puzzled. New varieties were introduced which seemed for a time to offer a solution, only to succumb in due course to the same trouble.

Another point which I remember clearly is that men cutting corn with the scythe, still a fairly common practice in those days, could always distinguish between a crop grown with muck and one grown with artificials, the straw of the former being tough and the straw of the latter brittle.

In 1911, I was fortunate in being able to make an extensive tour of the Niagara fruit belt in Ontario. Here I visited experimental stations and had the luck to meet a young man in charge of one of them who had served his time at the same nursery where I had learnt. He showed me his plan for combating the worst disease in apple trees, which opened my eyes to the value of humus in the form of green manuring with legumes, and of carbonate of lime to neutralize the soil. The trees were being given a new lease of life.

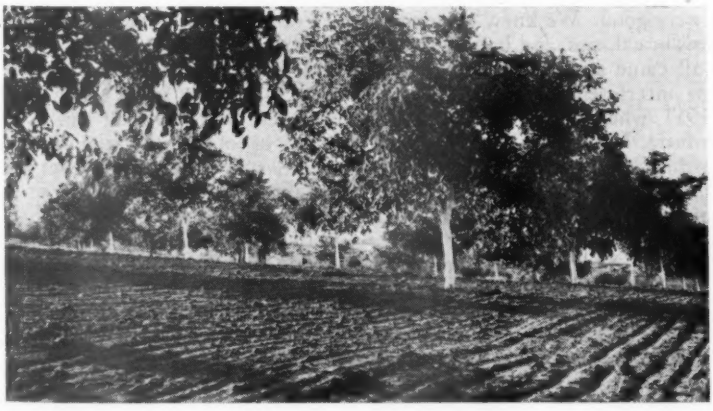
This experience and my early training decided me to become a lime and

manure merchant in England. This business enabled me to visit hundreds of farms and nurseries, and to add to my knowledge of problems associated with the land. I made a practice of calling on the most progressive and successful farmers and market gardeners, and many pleasant hours I spent in talks on crop production.

It was during this time that I came in contact with, and became a friend of, Robert Holmes of Norwich. He raised several new varieties of tomatoes which proved very popular with many growers. Robert Holmes was considered by well-known men to be one of the best tomato-growers in England. He attributed his results to using only natural manures. He also acted as adviser to other growers, and I remember his telling me that he had been called in by one of the largest growers in the Lea Valley to explain why this man was getting an average yield of only 4½ lbs. per plant. Holmes advised him to use only natural manure. The grower was not prepared to change his methods, but he did agree to let Holmes have a block of houses to carry out his demonstration with natural manures and undertook to pay him ½*d.* for every pound over 4½ lbs. per plant that he grew. If either party died, the contract ended forthwith, whether the crop was finished or not. It so happened that the grower did die before the crop was actually finished; yet Holmes had already earned £600 odd for the increased poundage he had produced. Surely this was proof enough that natural manures are the best.

If further evidence is needed as to the value of humus, surely the Lea Valley has provided it. For it is common knowledge there that when new land is taken for this crop—old pastures dug in—a yield of 60 tons an acre is usual; I have heard of 80 tons. Yet as the humus supplied by the grass is used up, yields fall, and in the third year when the soil has been exhausted of humus, 48 and 50 tons is the rule.

Despite this evidence, and later signs of diminishing fertility, growers continued to throw away their tomato haulm instead of composting it, and to replace this loss with bag fertilizer. Later on, yields fell to so low a point that the position became serious, tomato-growing being a speculative business. Then someone proved that, by sterilizing the soil with steam, certain organisms which occur in sick soil were killed and increased crops resulted. Today, this is a common practice. But the soil structure is altered,



and there is not the flavor in the tomatoes that there used to be. This is well-known by housewives; but what does it matter as long as the grower makes a profit!

There are still a few growers in Worthing who do not sterilize and yet get good yields. But they must be very few, as the average yield of tomatoes for the Worthing district growers, I am told, is about 33 tons an acre. Surely then there is something wrong with modern practices. Stable manure, of which in my early days we could get plenty cheap, is now almost extinct. Seaweed is now thrown back into the sea by the Council, as it is of a different nature from formerly and an offence to residents. This is owing to the pollution of the sea by the town's sewage, which is discharged untreated into it—a practice that most seaside towns adopt. House refuse is burnt or dumped, and all this fertilizing matter is replaced with chemical fertilizers.

I often think of the times when our fathers wasted nothing, returning waste products to the soil, and made their fortunes with grapes at 1*s.* or less per lb. and tomatoes 1*d.* per lb. I myself have produced and sold tons of tomatoes, packed in free packages, at 9*d.* per dozen lb. net. In those days we thought nothing of working in the summer from 4 a.m. to 8 p.m. We were happy and healthy, for food and drink were good. We knew nothing of vitamins or calories, and had no tinned food; all came straight from the land without interference.

In 1911, when I was touring southern Ontario, I visited a district which was farmed by descendants of pioneer German colonists and stayed for a month on one of their farms. These farmers were a remarkable people. They produced everything they consumed except tea; they even made their own soap. The manure was from livestock—cows, pigs and poultry. Artificials were unknown to them; so were diseases in cattle. Both men and women were fine specimens physically, and considering the amount of work they did they never seemed tired. The meals were banquets compared with our own in these days, and their life was a contrast to our own way of living. They were kindness itself, and happy; a spirit prevailed which one could attribute only to the natural food they enjoyed.

I believe that we are only on the fringe of discoveries as to the possibilities of composting, as I have myself proved and seen demonstrated on a large scale. In 1920, Robert Holmes, whom I have already mentioned, proved to the Norwich Council that with my method of composting refuse and sewage sludge the nitrogen content of the product was over 3 per cent without additions. Again, a very well-known market gardener in Essex composted waste materials and raised the nitrogen content to 8 per cent. So successful was this man that by his system of using compost and carbonate of lime (ground chalk) he made a profit on farms where five men before him had failed. All his produce was eagerly bought by neighboring towns and Covent Garden on quality and grading.

For over 50 years now, artificials have been given a good test. One thing has been proved, namely that none of the ills from which man and beast are now suffering can be laid at the door of the mystic muck, since this has been omitted from the old farming practices. If muck and compost were given less than half this trial, we should be a better-fed nation with a healthier outlook on life.

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THE FARMER'S HANDBOOK by John M. White (University of Oklahoma Press, Norman, Oklahoma.) 1948. $4.95.

Modern farming concerns so many fields of knowledge that it is absolutely essential that the farmer have at hand a handbook to guide him, to answer his questions, to insure him against losses caused by lack of special knowledge. The author has collected, classified, and coordinated a vast amount of knowledge which is invaluable to the modern farmer. The best methods are given for the laying out of orchards, the growing of grain crops as well as all other kinds of farm crops, the care of farm animals, the conservation of the soil, fish and wildlife, and the doing of all possible types of farm operations. The book is well bound and profusely illustrated, and should be within reaching distance of every farmer.

PROTOHISTORY by H. C. E. Zacharias (B. Herder Book Co., 15-17 South Broadway, St. Louis 2, Missouri.) 1947. $4.00.

This book gives a history of human thought from palaeolithic times to the Persian monarchy. By the study of written documents we can trace the ancestry of our institutions, our attitudes, and our beliefs back into the remote past. But vast periods of man's history preceded the earliest written records and can be learned only through archaeological discoveries, linguistic influences, geographical conditions, and the mingling of different kinds of civilizations. The author takes us back into the far distant past and by factual accounts based solely on ascertained data traces the development of society from simple family units to organized states and the rise and decline of human culture.

AZALEAS—KINDS AND CULTURE by H. Harold Hume (The Macmillan Company, New York, New York.) 1948. $3.75.

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GUIDE TO EASTERN FERNS by Edgar T. Wherry (University of Pennsylvania Press, 3446 Walnut Street, Philadelphia 4, Pa.) 1948. $2.00.

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OUR PLUNDERED PLANET by Fairfield Osborn (Little, Brown and Company, Boston, Mass.) 1948. $2.50.

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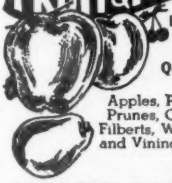

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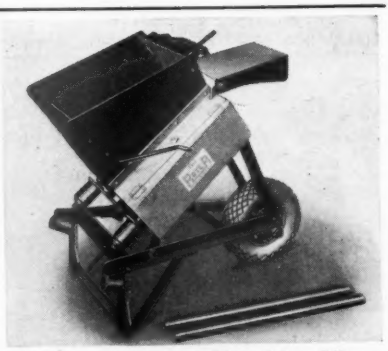

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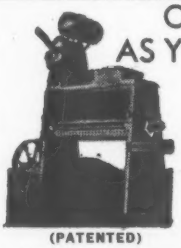

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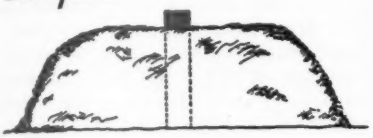
Compost



Clinic . . . .

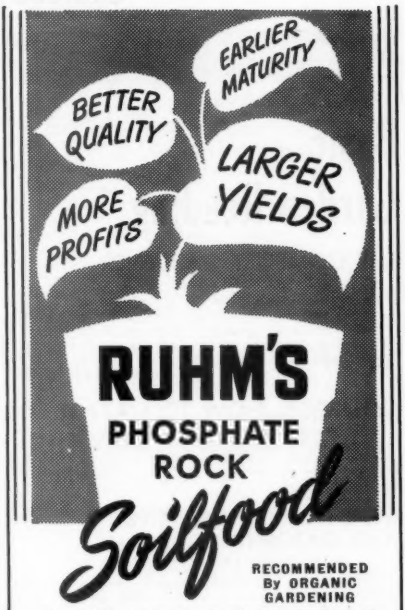
PEAT COMPOST FOR ACID LOVING PLANTS

June 16, 1948.

Gentlemen:

For three years I have been making compost for my camellia and azalea plants. But last winter Mrs. H. H. Bonnell of Philadelphia made a visit to Austin. It was my good fortune to meet her and show her my garden —and compost pile. When Mrs. Bonnell returned to her home in Philadelphia she sent me, *An Agricultural Testament* and as soon as I read the book half-way through I tore up my compost pile and started making it according to Sir Albert Howard. I bought in Louisiana in January of this year some new plants and planted them in the compost started when I read *An Agricultural Testament*. The difference between these plants and plants bought in the year before is marked.

This area is far too alkaline for such acid loving plants as azaleas and camellias, but I was reared in Mississippi where soil is right for these ornamentals and naturally I have wanted a garden of this type. Amazing though it really is, I have a beautiful garden of azaleas and camellias and each season I have wonderful flowers —between hard freeze. The Howard method is, I feel sure, my answer to prayer and I have one of the finest compost piles you ever saw right now in the making. This fall when cool weather begins I will renew all the



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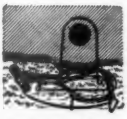

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mulches, do more transplanting and use up all my 10 x 10 stack of compost. Meantime I have started another one 4 x 10. Neighbors bring their grass clippings to me; my dairyman sells me his extra manure and for the layer of soil I use peat soil from a nearby county. This peat soil is very acid so that when I use my compost it tests slightly acid instead of alkaline—as it would necessarily be without the acid soil. All the soil manure and water we have here is alkaline. I use phosphoric acid in the water during the dry hot summers when I irrigate the camellias and azaleas. This holds down the alkaline content which would build up if I used the city water without acid.

Mrs. Bonnell was quite anxious for me to enroll in the School at Ambler, but the long session would be out of the question for me and I have not been able to find out so far, exactly what I might get from the summer school there.

There is here in Austin, another enthusiast on the Howard method. Brother Marcus of St. Edwards College. Brother Marcus has done wonderful work with compost on the

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grounds of St. Edwards. The farm land there is simply an alkaline hill side. He has made the soil productive and has shared his knowledge and experience with those who were interested. I have examined his compost in the different stages and of course to hear Bro. Marcus talk and then see his compost is an experience everybody should have.

I shall be one of your most interested and hard working disciples when I receive your magazine.

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Colorado **EARTHWORM HATCHERY**
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Denver 11 Colorado

Compost Correspondence . .

Q. Are snakes in the garden harmful or beneficial?
Mrs. M. A. F., Detroit, Mich.

A. Snakes are, with very few exceptions, highly beneficial animals for the farm and garden. Their food consists, for the most part, of insects and larger animals. Dr. Pfeiffer wrote an article for this magazine recently entitled, "After the Earthworm, the Toad." A suitable title for another article on farm and garden animals might be, "Next to the Toad, the Snake."

—o—

WHY NOT USE UNWILTED GRASS?

Q. Will you please tell me, where water is scarce, why one cannot make a compost heap of all green material before it has wilted and lost all that valuable moisture? If green, unwilted material were used, would it be necessary to use enough so that when it shrinks it would settle down to a 6 inch layer?
Mrs. T. M. B., Stilwell, Kansas.

A. Whether green material can be used without first allowing it to wilt depends largely upon the kind of plant and its age. The leaves and stems of

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ORGANIC GARDENING Emmaus, Pa.

young shoots, as lawn clippings, are apt to settle into wet, compact layers which are so poorly aerated that they undergo putrefaction rather than fermentation. If sufficient air could be supplied, or, to put it differently if the material could be prevented from forming compact layers, any unwilted plant materials could be used in the compost heap. The older plants are, the more fiber they contain and the greener they can be admitted to the compost heap without danger of settling into compact layers and putrefying.

—o—

EARTHWORMS IN THE COMPOST HEAP

Q. I hope that sometime you will explain fully the relation between earthworms and compost. Can earthworms be used for turning the compost heap?

H. S., Grant, Mich.

A. Earthworms, particularly the manure worm, may be placed in the compost heap as soon as the heat of fermentation has disappeared. This can be done by opening the heap here and there and placing 50 to 100 earthworms in each opening. They will multiply rapidly and will penetrate the entire heap and play an important part in converting the plant and animal residues into compost. When earthworms are used it is not necessary to turn the heap, although it will require a somewhat longer time to complete the composting processes.

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FERTILIZERS FOR BLUEBERRIES

Q. As a subscriber to your magazine I would like to ask if you advise the use of fertilizer on blueberry plants.

J. F., Allegan, Mich.

A. The best possible fertilizer for blueberry plants is acid leafmould or acid compost. The plants should be given in addition a generous mulch of leaves and should not be cultivated. If the soil is known to be deficient in any minerals, add them in the form of ground, untreated rocks.

—o—

DDT AND FISHES

Q. DDT has been sprayed by plane over Dade County, Florida to kill mosquitoes. We still have flies and mosquitoes, but the fishes are dead. What is your reaction to the use of such poisons?

A. We are opposed to the use of all poisonous sprays and dusts, as they upset the balance of nature and also, as you have reported, kill all kinds of beneficial animals and plants. The damages done by such poisons are greater and more far reaching than any of us realize.

—o—

COVER CROP

Q. I wish to disagree with the advisability of plowing under a cover crop while it is young and tender, a point I have seen published many times. What is your advice on this?

J. H. D., Houston, Texas.

A. A cover crop may be grown for different purposes as to increase the nitrogen content of the soil, in-

crease the organic content of the soil, the prevention of soil erosion, and the like. If the plowing under of a cover crop is to be followed almost immediately with the planting of another crop, it is advisable to plow under when young and tender so that the plant material will be broken down before the following crop makes many demands upon the soil for nutrient materials. If the purpose of the cover crop is to increase the humus in the soil and is not to be followed immediately by the planting of another crop, it is best to allow the cover crop plants to grow almost to maturity.

—o—

TALL AND LIMBER SEEDLINGS

Q. My seedlings, started in a flat in the house for transplanting to the vegetable garden later, always grow tall and limber and have not the strength to support themselves so that they lay over the ground. Can you tell me what is wrong?

C. M. B., Schwenksville, Pa.

A. Your seedlings were grown with too much heat and with too little light. The richer the soil in which seedlings are grown, the more important it is to keep the temperature down and the light bright.

—o—

FRESH MANURE vs. COMPOST

Q. What is the difference between fresh manure and compost? Is one who uses fresh manure as a fertilizer practicing the organic method?

R. F., Fremont, Iowa.

A. Fresh manure is an unbalanced organic fertilizer and should not be used until it has been acted upon by the organisms in the soil. To practice the organic method, it is necessary to compost the manure with three times its volume of plant materials. Compost is a balanced organic fertilizer which regulates the flow of nutrient elements to growing plants.

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